AVIATION

The Oldest American Aeronautical Magazine

APRIL 9, 1928 Issued Weekly PRICE 20 CENTS

An aerial view of the business section of the City of Baltimore, Md.

VOLUME XXIV

NUMBER 15

Special Features

The Curtiss "Fledgling"
The Loening Cabin Amphibian
Second Gordon Bennett Trophy Balloon Race

AVIATION PUBLISHING CORPORATION
250 WEST 57 STREET, NEW YORK

Publication Office, Highland, N. Y. Entered as Second-Class Matter, Nov. 25, 1920, at the Post Office at Highland, N. Y. under Act of March 3, 1879.

NOW TO PUT IN PRACTICE THE THINGS THAT LAST YEAR PROVED

LAST year's events proved *to the public* that the airplane can fly great distances, that it covers those distances more rapidly than they can be covered in any other way, and that the weather no longer controls flying of a normal character.

Those are very valuable assets to commercial aviation now. But it is to be doubted whether further effort along last year's spectacular lines can add a single bit more value to them.

We believe 1928 will show a remarkable expansion of air transport service—passengers and express as well as mail. And we expect a real demand for this service from the general public. *Probably there was never so great an opportunity for profitable airline operation as exists today.*

This is the work the Ford all-metal, tri-motored transport monoplane is built for, and which it has been carrying on with conspicuous success and safety over a period of several years.

As the ultimate success of any airline—regardless of other favorable factors—depends on the regularity of service, high percentage of on-time arrivals, and freedom from minor as well as major accidents, we believe any man interested in the organization, management, and expansion of airlines will profit by a thorough study of the Ford plane, and careful consideration of its application to his needs.

We will be glad to furnish any information he may want regarding the structure and performance of Ford planes, as well as any advice he may request pertaining to inaugurating and operating an airline or on any other phase of aviation in which we have taken an active part. Write direct to

THE STOUT METAL AIRPLANE CO.
Division of
FORD MOTOR COMPANY
Dearborn, Michigan

What Engine...?

The PROBLEM

THE surplus war stock of staunch OX motors is practically exhausted. The popular demand for 110-140 H.P. motored airplanes is increasing phenomenally. What is the engine for this year's crop of low-powered training, commercial and general-utility aircraft . . . . . *and who will build it?*

The SOLUTION

The engine manufacturer who successfully serves this market must have more than a proven power plant. His source of materials must be reliable. His factory equipment must be complete and self-contained. His organization must be trained to fabricate, install and service his product.

The ENGINE *and the* ORGANIZATION

To this solution the Fairchild-Caminez engine is dedicated and backed by a thoroughly equipped plant with the latest precision machinery, manned by an organization trained in every phase of aviation development. Completely manufactured in the Fairchild-Caminez plant—from the analysis of materials to the test block—the Fairchild-Caminez is a simple engine with a big story of achievement. All parts are interchangeable and available at four convenient factory branches.

Used in KREIDER-REISNER TRAVEL AIR, WACO *'Planes*

For complete technical details and specifications send for the Caminez Engine booklet.

FAIRCHILD CAMINEZ ENGINE CORPORATION
FARMINGDALE, N. Y.
SUBSIDIARY OF FAIRCHILD AVIATION CORPORATION

CAMINEZ ENGINES

WACO TEN
OX5 MOTOR

WACO VALUES ACCUMULATE

THE air minded pilots of the country have always looked to WACO for everything new — they have been satisfied as is evidenced by the leadership of WACO in sales records for the past year

With the certain exhaustion of OX-5 motor supply, sometime during the coming year, WACO engineers have made exhaustive studies of the new production motors Three have been accepted for production — motors ordered in quantities — deliveries being made

Again it is certain that the air minded have looked to WACO, in this change from the old to the new Orders from the flying public have poured in for the Whirlwind, Ryan Siemens and Caminez motors. The success of WACO with these units is assured.

The WACO TEN, with the addition of these new motors accumulates in value — it has greater speed, quicker take-off than ever before, faster climb, more dependable and its general performance is increased

Ask our nearest distributor to explain these new motors — take a ride and convince yourself A letter will bring our newest catalogue showing them in detail

WACO AIRPLANES

See WACO at All-American Aircraft Show, Detroit, April 14 to 21.

THE ADVANCE AIRCRAFT COMPANY, TROY, OHIO

WACO DISTRIBUTORS

Aircraft Sales Company of Oklahoma, Tulsa, Oklahoma—*State of Okla.*

American Aircraft Corporation, Marriott Building, Los Angeles, California—*Cal., Nevada, New Mexico, Arizona, Utah*

Doug Davis Flying Service, Inc., 1438 Copeland, Atlanta, Georgia—*Georgia Alabama*

Rankin Flying Service, Portland Oregon—*Oregon and Wash.*

Knapp Flying Service, Ypsilanti, Michigan—*Michigan Toledo, O and vicinity*

Tex LaGrone, 441 Balckerbocker Place, Kansas City Missouri—*Mo and Kansas*

Ludington Exhibition Company, 810 Atlantic Building, Philadelphia, Pennsylvania—*Eastern Pennsylvania, New Jersey Delaware, and Eastern Maryland*

Midwest Airways, Monmouth Illinois—*Illinois and Iowa*

Montana Air Service, Dillon Montana—*Western Montana*

New England Aircraft Corporation, 605 Main Street, Hartford, Connecticut—*New England States*

Midsouth Airways, Crosstown Station, Memphis, Tennessee—*Arkansas and Mississippi*

Southern Dusting Company Tallulah, Louisiana—*Louisiana*

Earl T Vance, Great Falls, Montana—*Eastern Montana and Western N D*

Embry Riddle Cincinnati, Ohio—*Ky. Ohio Ex Kentucky S E Ind.*

Akron Airports, Inc, Akron Ohio—*Northern Ohio*

Bernard Air Lines, Inc Youngstown, Ohio—*Youngstown and vicinity*

J H Moore Co., Steubenville, O—*Steubenville and vicinity*

Gast and Miles, Louisville Ky—*Western Ky, Ea. Tenn.*

West Virginia WACO Sales, Wheeling, West Virginia—*West Virginia*

Buffalo Aircraft Dis., Inc., Buffalo, New York—*Western New York State*

University Aerial Service, Austin, Texas—*State of Texas*

Elliott Springs, Fort Mill, South Carolina—*North and South Carolina*

Clifford Ball, McKeesport, Pennsylvania—*Pittsburgh and Vicinity*

Northern Airways, Inc., Wausau, Wisconsin—*Wisconsin and Minnesota*

Capitol Airways, Inc., 3515 Colorado Ave., N W, Washington D C.—*Western Maryland and D C*

Clyde Shockley Kokomo, Indiana—*Northern Indiana*

Rollin H Stewart, Indianapolis Aviation Co., Indianapolis, Indiana—*Central and Southern Indiana*

Alfredo Hurtado, El Pais, Havana, Cuba—*Island of Cuba*

Edgar Nilson-Harold Muller Co., Orlando, Fla.—*Florida*

DISTRIBUTORS

Capitol Airways, Inc., Washington, D.C.
Mayer Aircraft Corp'n, Bridgeville, Pa.
Buffalo Aircraft Distrib Buffalo N Y
Knapp Flying Service, Ypsilanti Michigan.
Midwest Airways, Inc Milwaukee, Wisconsin.
Von Hoffman Aircraft Corporation, Anglum Missouri
Midwest Airways Corp'n, Monmouth, Illinois.

PHIL BALL, better known as the owner of the *St. Louis Browns*, uses his *Ryan Brougham* almost entirely for business trips over the country He has travelled 20,000 miles in four months of flying, and in February he said: "The *Ryan Brougham* is an economical time saver. It costs surprisingly little to operate and it will take me anywhere I want to go in one hop Chicago, Tulsa, Detroit, Cleveland, Pittsburgh or Atlanta. . . . I find that traveling by plane is faster and more comfortable than by auto or train, and a lot more interesting" ¶ Brougham owners everywhere report unusual economy. With its speed performance , dependability . . . comfort , economy —, this sister-ship of the *"Spirit of St. Louis"* has no difficulty in maintaining its unrivaled popularity Equipment is complete and fine in every particular

DISTRIBUTORS

C. S. Yarnell, Minneapolis, Minn.
Stransky Airlines, Inc Pukwana So. Dakota
Southwest Ryan Airlines, Tulsa, Oklahoma.
Missouri Airplane Services, San Antonio, Texas.
Mutual Aircraft Corporation, Los Angeles, California.
Rankin Flying Service, Portland, Oregon.
M. A. Zanger, Central America.

Mahoney distributor franchises are valuable. . . Only qualified business executives and operators will be considered.

'U S. Dept. of Commerce Approved Type Certificate No. AT-25

The B. F. MAHONEY AIRCRAFT CORP'N

San Diego California

AM5

AVIATION

The Oldest American Aeronautical Magazine

EARL D. OSBORN, *President and Publisher*
LESTER D GARDNER, *Director*
GEORGE NEWBOLD, *Business Manager*
L. D. WEBSTER, *Treasurer*
R. SIDNEY BOWEN, JR., *Managing Editor*
RICHARD M. MOCK, *Technical Editor*
ALBERT F. MULLADY, *Assistant Editor*
DAVID J. LEISK, *Art Editor*

Vol. XXIV April 9, 1928 No. 15

Index to Contents

AVIATION PUBLISHING CORPORATION
Business and Editorial Offices
250 West 57th St., New York City
Cable Address: AEROENG
Publication Office: Highland, New York

Subscription price Four dollars per year. Canada, five dollars. Foreign, six dollars. Single current copies, twenty cents. Back numbers, 25 cents. Advertising rates on application. Issued every Monday. Forms close ten days previously. Entered as second-class matter Nov. 23, 1919, at the Post Office at Highland, N. Y., under act of March 3, 1879.

For Your Convenience in Subscribing

Please send AVIATION to

.....

.....

.....

Enclosed find check ( ) money order ( ) for $ . . . .

AVIATION

The Oldest American Aeronautical Magazine

Vol. XXIV *APRIL 9, 1928* No. 15

One Carrier, Fifteen Cruisers!

AS A result of the Naval Disarmament Conference it was decided that two cruisers which were being built by the United States would be converted into aircraft carriers. These are the Lexington and the Saratoga. At the same time, it was considered that they would be the finest carriers in the world and this expectation has probably been realized. However, there is a definite limit to the gross tonnage of aircraft carriers allowed the United States by the Washington Conference and it is now felt that we would have done far better to have built twice as many carriers of half the tonnage. Large and small carriers are equally vulnerable and as the offensive power of two small carriers is the same or greater than that of one big carrier, it is felt that it is more advantageous to have two ships instead of one.

We have two giant carriers and the Langley, which is about the right size, but being a very ancient collier which has been converted, it is not fast enough to keep up with the fleet. Effectively then, we have two carriers against six for England and three for Japan.

In his report to the appropriations committee, Admiral Moffett asked for five additional carriers of 13,800 tons each. He got one, but appropriations were passed for the building of fifteen cruisers.

It is conceded that the final word in aerial warfare at sea has not been spoken, but as far as we now know, aircraft carriers are the most effective method of maintaining air supremacy when far from a home base. Even the old time Navy men are beginning to realize and admit that the fleet which is inferior in the air is at a terrible handicap, yet Congress orders one aircraft carrier and fifteen cruisers!

Congratulations, Eddie!

IT IS certainly good to have the world's endurance record back in this country. Especially pleasing is it to have the record brought back by a type of plane which has been and is being produced in quantity for commercial use. The Stinson-Detroiter has again demonstrated the efficiency which won for it first place in last year's Ford Reliability Tour. Eddie Stinson and George Haldeman have done a fine piece of work and deserve the heartiest of congratulations. There is no record which has a more direct bearing on commercial usefulness than the world's endurance record. It denotes great stamina on the part of the engine, efficiency in carrying great weights on the part of the plane, and low fuel consumption, which is partly a matter of the engine design and partly a matter of good aerodynamic qualities at cruising speed.

Go to the Show

FROM APRIL 14 to April 21 Detroit will be the center of aeronautical interest in the United States. The list of exhibitors reveals that practically every manufacturer of planes or accessories will display his latest products. All those who are interested in aeronautics should attend the Show. They will see assembled under one roof everything that is worth seeing. The public will have an opportunity of learning of the tremendous progress which has been made. They will find that planes can be useful to them in many ways.

For the designers, dealers, and distributors of airplanes and accessories, the Show will be of immense value. The expense and the time involved in going to Detroit will be well repaid. Direct comparison of the products of the manufacturers will help dealers in choosing those which they wish to handle. They may find new lines which they can take on to advantage. Engineers are bound to get new ideas which will be of value to them. Then there are the personal contacts which are made at such a gathering and which may lead to many things. In short, the Detroit Show is too important an occasion to miss.

Repaying a Debt

UNTIL VERY recently civil aviation has been largely dependent on military development and pioneering at governmental expense, but the situation is soon likely to be reversed. Already many more students are learning to fly in civilian rather than in military schools, and the Army and Navy will soon have a reserve of young men who have had their primary training. Already civil landing fields far outnumber the military fields and in case of mobilization these fields would prove invaluable. Military aircraft factories are still far larger than civilian factories, but at the present rate of growth this condition will not last long.

Even now the scienes of flying through heretofore impossible weather conditions is being more actively developed by our air mail pilots and transport companies than it is by the military. When our air mail pilots can fly blind from New York to Cleveland, bombing pilots can learn to do the same thing and escape contact with "Archies" and pursuit planes. The development of planes of the type indicated in the Guggenheim Safety Competition may prove invaluable for making landings on the deck of a ship.

Civil aviation owes an enormous debt to military aviation but there is every indication that this debt will be repaid with interest.

The Curtiss "Fledgling"

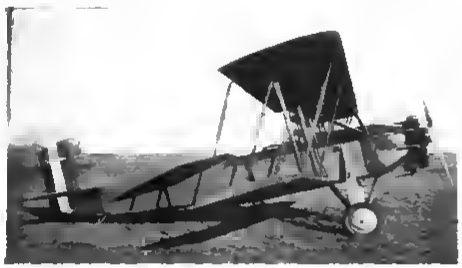
New Navy Training Plane Powered with a Whirlwind Can be Fitted For All-Round Service as a Land Plane or Seaplane

By RICHARD M. MOCK

PRELIMINARY FLIGHT tests were recently completed on the Curtiss "Fledgling", a Wright Whirlwind powered training plane for the Navy. The Fledgling or, as it is officially designated by the Navy Department, the XN2C-1 was built by the Curtiss Aeroplane & Motor Co., Inc., Garden City, Long Island, N. Y., as the result of a training plane design competition won by that company last year. Three planes of this type were ordered for service test, the first of which was recently completed.

The Fledgling is a two bay biplane with steel tubular fuselage and wood wings. To distinguish it as a training plane it is finished in a bright yellow hue except for the rudder, which is red, white and blue. The plane was intended for either primary or advanced training and therefore dual tandem control is provided, with the rear cockpit installations removable. Fittings are provided for equipment for fixed gunnery, flexible gunnery, radio "spotting" and bombing practice. The Fledgling has been tested both as a land plane and as a seaplane and although official performance figures cannot be published at this time it has been stated unofficially to have a top speed of 110 m.p.h. with a landing speed of 45 m.p.h., to have a climb of more than 1,000 f.p.m. and a service ceiling above 16,000 ft.

The XN2C-1 is so constructed that it can be easily put into mass production at a low cost. Straight lines and flat surfaces are used wherever it is possible without affecting the



Side view of the Curtiss "Fledgling"

aerodynamic characteristics. The fuselage is made up entirely of straight lines except for the engine cowling. The sides are flat and beveled at the top thus making the fuselage six-sided with a flat top and bottom. However, the internal fuselage structure is conventional, consisting of four longerons with a turtle deck above. The wings are also of simple construction. All the ribs are the same and the rigging is such as to enable economy in production as well as in maintenance. In addition to the land undercarriage a single float and wing tip floats have been built for use as a seaplane. The float is of wood and like the rest of the plane is made up almost entirely of straight lines and flat surfaces so that it can be put into large scale production cheaply.

Having been built as a training plane, the Fledgling is of sturdy construction to withstand excessive abuse and is designed with a view towards the safety of both the instructor

Front quarter view of the new Navy training plane, the Curtiss "Fledgling"

and student under all conditions. In the event of an accident the chances of the occupants being hurt are reduced to a minimum. They sit well back in the fuselage so that the welded steel fuselage will absorb the shock. All instruments, though inside the cockpits, are out of the way with none in front of either the instructor or the student. In the place normally occupied by the instrument board are large rectangular cushions or "crash pads". Controls are such that there is little chance of fowling. The ailerons and rudder are controlled by push rods while the elevator is actuated by cables outside the fuselage. At all critical points inspection windows are provided. Vision is very much like that on standard service planes with the forward cockpit almost under the trailing edge of the upper wing. The enormous stagger and the cut-out of both upper and lower wing tend to decrease the blind angle.

The wings are of two bay design with large stagger but no sweep back. The stagger is such that the rear spar of the upper wing is almost directly above the front spar of the lower wing. Only a single set of flying wires and a single set of landing wires are used. They are in the plane of these spars which is almost vertical. The flying wires are reinforced at the inner bay by an additional wire from the forward spar fitting of the upper wing to the front end of the lower fuselage longeron. A handy feature provided in the rigging of the wings is that the interplane struts are fitted with a universal joint at the top to facilitate assembly. Internally, the wing structure is of wood, except for the drag bracing, the fittings and the leading edge of the upper wing.

The wing beams are of routed spruce except at several places where a rectangular section can be used without an appreciable gain in weight. To these are attached a very efficient type of rib. It is built up of cap strips and cross members in the usual way, but contrary to standard practice, has a plywood web only on one side. This plywood web replaces the customary gussets and reinforces the cap strips and cross bracing as well. The web is routed to conform with the contour of the cap strip besides replacing the gussets. The rib is light and strong and it is only necessary to tack from one side.

Compression members between the spars consist of two spruce members with a plywood web on one side similar to the ribs except that the side web is not routed. The spruce members or cap strips are flush with the top and bottom of the spars. Light vertical spruce blocks are used to space the cap strips. Round tie rods are used for diagonal bracing. To preserve the profile of the wing, which is a Curtiss C-72 section, the leading edge is reinforced. Sheet duralumin is used for the upper wing while the leading edge of the lower wing is reinforced with plywood, as when the plane is used as a seaplane the duralumin on the lower wing would be apt to corrode. A flat wood strip is used for the trailing edge. Fittings are provided above the center section to facilitate hoisting. A handle is cut out of the trailing edge of the center section for one to grasp when entering or leaving the front cockpit.

The fuselage is of welded steel tubing and, following Curtiss practice, hollow rivets are used where the members are telescoped. Welded steel tubing is employed throughout including the turtle deck as well as the mount for the fixed machine gun in front of the forward cockpit, which also forms the frame for the cowling. Warren trussing is used for the fuselage bracing, with no wires or tie rods. Directly behind the engine is a riveted and beaded, half hard, brass oil tank of 3½ gal. and a similar gasoline tank of 40 gal. Behind this is a fire wall of the same material, 020 in. thick, with a vertical glass gauge behind it to show gasoline level to the occupant of the front cockpit. The cockpits are in tandem with adjustable seats. This adjustment is similar to that on most military planes in that the seat is suspended by rubber cord and can be raised to the desired position by the release of a catch. When one's weight is on the seat, should the catch be released, the seat will drop slowly until it is in the proper position, when the catch can again be engaged. Rudder pedals are fitted with blocks on hinges so that with the blocks in place there is the effect of changing the position of the rudder pedal for one of small stature. Instruments are mounted on vertical panels at each side of the cockpit in an out-of-the-way, yet visible, position. The installations of the rear cockpit are removable to convert the plane from a primary to an advanced training plane. The stick control

Front view of the Curtiss "Fledgling" fitted as a seaplane.

can be detached as a unit, the rear seat can be taken out, and a small forward auxiliary folding seat lowered if desired. Provision is made for equipment for both fixed and flexible gunnery, radio "sighting" and bombing practice. Machine gun mounts are provided with a fixed Browning machine gun firing through the propeller from a position in front of the forward cockpit above the fuselage. A Lewis gun can be mounted on a flexible ring at the rear cockpit. Both guns are operated by triggers on the control stick. At each side of the rear cockpit is a fire step of Haskelite plywood for the gunner when using the flexible gun. The flooring under the seats is of Haskelite, while behind the rear seat, to carry heavy loads, the bottom of the fuselage is of corrugated duralumin. In the turtle deck behind the seat is a

Continued on page 907

Action picture of the new Curtiss "Fledgling" in the air.

Loening Cabin Amphibian

First Loening Commercial Amphibian Carries Four to Six Passengers And is Powered with a 425 Hp. "Wasp" Engine

A SHORT TIME ago the Loening Aeronautical Engineering Corp., New York City, announced its intention of building commercial amphibians as well as continuing with the construction of its military types. About two weeks ago the first commercial model was completed and, at the time of this writing, is undergoing flight tests before being flown to Detroit, Mich., for the All-American Aircraft Show.

The Loening Cabin Amphibian is a direct development from the Loening OL-8, an open cockpit amphibian powered with a 425 hp. Pratt & Whitney Wasp engine. Like the OL-8 which is a standard service type now in production for the U. S. Navy, it is a tractor biplane with the body or fuselage mounted directly above a hull that protrudes in front of the propeller. Structurally the plane is very similar to the service model. The wings and hull are identical, while the rear cockpit has been covered over and upholstered as a closed cabin to hold from four to six people. To overcome this additional weight in the rear, the engine and the pilot's cockpit have been moved forward one foot, allowing a larger cabin as well as increasing the vision of the pilot. Behind the cockpit, the body has been widened, increasing the size of the cabin and giving some forward vision for the passengers. The cabin is richly upholstered, in the manner of an expensive motor car or boat. The interior is very roomy, with a baggage compartment forward and a small lavatory in a separate compartment in the rear. The commercial model is slightly heavier than the service type, weighing 3,400 lb. empty as compared with 3,253 lb. It carries a disposable load of 2,000 lb. of which 1,200 lb. is pay load, giving a gross flying weight of 5,400 lb. The OL-8 weighs 5,253 lb. loaded. With this load, which includes 140 gal. of gasoline, the plane is estimated to have a high speed of 120 m.p.h., to land at 50 m.p.h., and to have a ceiling of 14,000 ft.

Close up of the cabin showing one door and a section of the interior

A very effective color scheme has been applied. The external coloring is high visibility orange in contrast with a

Continued on page 902

Front quarter view of the new Loening Cabin Amphibian resting on the water

The Second Gordon Bennett Trophy Balloon Race

Special Regulations for the 1928 Lighter-than-Air Classic

ANNOUNCEMENT of the special 1928 regulations for the Second Gordon Bennett Trophy balloon race competition has been made by C. F. Schory, secretary of the contest committee of the National Aeronautic Association. The race will take place June 30, at Detroit, Mich. The race will be held under the General Regulations of the F.A.I., and under the special regulations governing it adopted by the Central Committee of the F.A.I., at its meeting of Dec. 18-20, 1924.

The following regulations, drawn up by the Contest Committee of the National Aeronautic Association, will also govern it.

Art. 1. Entries must reach the National Aeronautic Association, 910 17th Street, N.W., Washington, D. C., before April 1, 1928. The names of the pilots, their annual license number, balloon numbers and a statement of the cubic capacity of their respective balloons must reach the National Aeronautic Association before June 1, 1928.

Art. 2. The balloons will be inflated at Ford Airport, Detroit, Mich. The start will be made on Saturday, June 30, 1928, after 4 P.M., Eastern Standad Time.

Art. 3. The Trophy will be awarded in conformity with Art. 16 of the General Regulations for the Gordon Bennett Trophy. Special medal. The participants (pilots and aides) will receive a souvenir medal struck in commemoration of the race.

The prizes designated below will be awarded to the entrants:

1st Prize—(a) $1,000.00
(b) Half of the total amount of the entry fees that are not repaid and the forfeits.

2nd Prize—(a) $800.00
(b) One third of the total amount of the entry fees that are not repaid and the forfeits.

3rd Prize—(a) $600.00
(b) The remainder of the total amount of the entry fees that are not repaid and the forfeits.

4th Prize— $400.00

5th Prize— $200.00

Expense Bonuses. Each foreign pilot who has his equipment on the field in condition to go at the appointed time will receive an expense bonus of $300.00; in addition, each foreign team of one to three contestants will receive $500.00 to be equally divided. Each pilot of the American team will receive an expense bonus of $100.00. Expense bonuses are payable on the day of start.

Art. 4. Items Required: In addition to the balloon proper, each contestant must be provided with the following:

(a) 25 meters of inflation tubing, approximately 300 mm. in diameter, and the necessary coupling.
(b) 150 ballast bags for use in inflation.
(c) 1 inflating canvas (ground cloth).
(d) 1 barograph intended to supply data, this instrument will be lead-sealed by the officials.

Art. 5. Shipment: The equipment must reach Detroit, with all charges paid, between June 15 and June 25, and should be addressed as follows: National Aeronautic Association, Care Detroit Board of Commerce, Detroit, Mich., U. S. A. The following notation is to be made on the waybill, in the column marked "Contents," below the statement of the latter: "Material aeronautique destine a participer a la Deuxieme Coupe Gordon Bennett 1928, organisee par National Aeronautic Association of U. S. A."

The "Detroit" (Hill and Schlosser) winner of the 1927 Gordon Bennett Trophy Balloon Race.

(Aeronautic equipment to be used in competing for the Second Gordon Bennett Cup in 1928, organized by the National Aeronautic Association of U. S. A.)

The shipping cases should be marked plainly and exactly with the *name of the owner of the balloon*, so that they may be identified on arrival at New York and so as to insure exemption *from customs duties*.

Art. 6. The keeping and the guarding of equipment will be assured at Detroit by representatives of the National Aeronautic Association. The competitors should look after the removal and the packing of the material left on the field after the departure of the balloons. The National Aeronautic Association declines all responsibility in this regard.

Art. 7. Verification of the cubic capacity of the balloons will be attended to by representatives of the Contest Committee of the National Aeronautic Association from June 20

Continued on page 900

Materials *of* Construction

Stress Analysis of Commercial Aircraft, Chapter Number Five

By PROFESSOR ALEXANDER KLEMIN
Daniel Guggenheim School of Aeronautics

And GEORGE F. TITTERTON
Late of the Bureau of Aeronautics Navy Department

IN THE present day construction of aircraft steel is used almost exclusively for fuselage, wing struts, and chassis. Several types of steel are commonly used, namely, mild carbon, nickel, and chrome molybdenum steels. These are known as 1025, 2330 and 4130 steels respectively, in accordance with the Society of Automotive Engineers' specification numbers. The key to this system is as follows. The first figure indicates the class to which the steel belongs: thus "1—" indicates a carbon steel, "2—" a nickel steel, etc. In the case of alloy steels the second figure generally indicates the approximate percentage of the predominant alloying element. Usually the last two figures indicate the average carbon-content in "Points", or hundredths of 1 per cent. Thus "2340" indicates nickel steel of approximately 3 per cent. nickel (3.25 to 3.75), and 0.40 per cent. carbon (0.35 to 0.45), and 4130 indicates a molybdenum steel of approximately 1 per cent. nickel and 0.30 per cent carbon. The basic numerals for the more common steels are:

Carbon Steels	1
Nickel Steels	2
Nickel-Chromium Steels	3
Molybdenum Steels	4
Chromium Steels	5
Chromium-Vanadium Steels	6

The allowable stresses in pounds per square inch as specified in the Handbook for steels commonly used in airplane construction are given in Table 2.

The ductility of steel is very important in airplane work. This in general means the ability of steel to elongate under load without failure. It is in contrast to the term "brittle". The ductility of steel, as measured by the elongation and reduction of area, is a criterion of the ability of the material to absorb energy without breaking. As a general rule the greater the strength of a material the less its ductility will be. It is for this reason that it is preferable in all cases, save where a considerable reduction in weight is possible, to use mild carbon steel instead of going to the stronger alloys.

Table 2 – Properties of Steel

	Commercial	Mild Carbon	Chrome-Molyb	Heat Treated Alloy Steels		
Steel No	[illegible]	[illegible]	4,130	[illegible]	[illegible]	[illegible]
Ultimate Tensile Strength	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Yield Point	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Shearing Strength	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bearing Strength	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Modulus of Elasticity	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

The steels used in airplane construction are divided into four classes, depending upon their method of manufacture:

1. Sheet, 2. Bar, 3. Tube, 4. Wire.

1. Steel Sheet—Steel sheet is used almost exclusively for fittings. In forming a fitting it is necessary to make sharp bends, and oftentimes to weld and braze. The best steel for these purposes is 1025, mild carbon steel. All fittings should be made of this steel unless a very much greater strength is required.

The best of the alloy steels for fittings is 6123, a chrome-vanadium steel. This steel can be welded easily and does not crack in bending and forming operations. In assembling a fitting all welding and brazing operations should be performed and then the fitting as a whole heat-treated. This metal cannot be used without heat-treatment. The maximum allowable ultimate strength for this alloy steel when used in fittings is 110,000 lb. per square inch. Fittings are subjected to shock and vibrational loads that demand a high degree of ductility of the metal. Heat-treated chrome-vanadium steel with an ultimate strength much over 110,000 lb. has not sufficient ductility for the purpose.

Table 3.

Outside Diameter	1015-20-25 Steel E = 28,000,000 C = 1	C = 2	Chrome-Molyb 4130 E = 29,000,000 C = 1	C = 2	Duralumin E = 10,000,000 C = 1	C = 2
1/4	10	14				
5/16	12	17				
3/8	15	21				
1/2	20	28				
5/8	25	37	21	30	17	24
3/4	31	38	25	36	20	29
7/8	37	52	29	41	23	33
1	42	59	33	47	27	38
1 1/8	48	68	38	53	31	43
1 1/4	53	75	42	60	35	49
1 3/8	59	82	46	65	38	53
1 1/2	64	90	50	71	41	58
1 5/8	69	98	55	77	45	63
1 3/4			59	83	48	68
1 7/8			63	89	51	73
2			67	94	55	78
2 1/4			75	106	61	87
2 1/2			84	118	68	97
2 3/4			93	131	75	106
3			101	142	83	117

Streamline tubes formed from flat sheet and welded along the trailing edge are listed as "Commercial" by the Department of Commerce and the properties under the heading only are allowed.

2. Bar Steel—Steels used in bar form in airplane construction are plain carbon steels Nos. 1015, 1020, 1035, and 1045, and alloy steel No. 2330.

Steel No 1015 is generally used for case-hardened parts. Steel No 1020 is used for nuts, machine screws, and other low-stressed structural steel parts. Steels Nos. 1035 and 1045 are used for forgings and medium stressed structural parts.

The alloys steels are used principally for bolts, pins, clevises and other highly stressed parts. The steel is heat-treated to develop a tensile strength greater than 100,000 lb. per sq. in. Nickel steel bolts in particular are widely used because of the great shearing strength of this material.

3. Steel Tubing—Steel tubing is used for a great many structural members in aircraft. More especially it is used for members taking direct compression loads. For this reason it is especially important that the tubes should be straight and homogeneous. If they are not, secondary stresses will be induced which will cause failure at a much smaller load. The steels generally employed in fabricating seamless steel tubing are Nos. 1025 and 4130.

Mild carbon steel, No. 1025, welds easily and is readily obtainable. Its modulus of elasticity is 28,000,000 and ultimate tensile strength 55,000 lb. per sq. in. Against this we have chrome-molybdenum steel which also welds easily and is daily becoming more common. Its modulus of elasticity is 29,000,000 and ultimate tensile strength 90,000 lb. in the un-heat-treated condition. For tension members and for short compression members the chrome-molybdenum steel is much lighter for a given load. However for long compression members which fall under the Euler formula this advantage is not so pronounced as for these lengths the column strength depends only upon the modulus of elasticity of the material.

Columns—In computing the allowable stress in steel or duralumin columns we must consider the length of the tube.

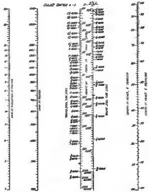


Fig 42. Nomographic chart for steel tubes as long columns (Euler's formula.)

If it is short it will fall within the Johnson formula and if it is long it will be in the Euler range. Table 3 gives the maximum length of tubing for any diameter that falls within the Johnson formula; this then is the minimum length of tubing that lies within the Euler range.

Long Columns—Fig. 42 is constructed for tubes falling in the Euler range. This nomographic chart is applicable to mild steel, chrome-molybdenum, and dural tubing. For mild steel the length scale on the extreme right marked E = 28,000,000 must be used; for chrome-molybdenum the length scale marked E = 29,000,000 is used; for dural tubes this latter scale is also used and the results obtained divided by three. This method of figuring dural tubes will give values about 2 per cent. on the safe side.

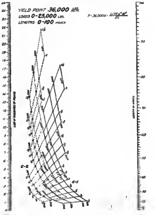


Fig. 43. Chart for steel tubes as short columns, etc., 36,000.

The load scale of Fig. 42 is constructed on the basis of a restraint coefficient of unity (C = 1). It may be used however for any value of the restraint coefficient by multiplying the load obtained by the value of C that is allowable. Thus for C = 2 the allowable loads as read from the chart must be doubled.

If it is desired to check a value obtained from the chart or to obtain the allowable load column whose length is greater than 100 inches, the limit of the chart, the formula given at the top of the figure may be used. Various values of I are tried until an allowable load sufficiently large is obtained. The values of I for all commonly used tubes of various thicknesses is given in Table 4.

Short Columns—Fig. 43 is a nomographic chart for mild steel tubes designed by the Johnson formula. For C = 1 the full lines are used and for C = 2 the dotted lines. As in the

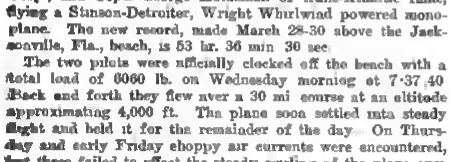
Continued on page 896

Stinson *and* Haldeman Set New Endurance Record

Keep Stinson-Detroiter Monoplane Aloft for 53 Hr. 36 Min. 30 Sec.

BETTERED BY more then an hour the world's airplane flight endurance record has been brought back to America by Eddie Stinson, president of the Stinson Aircraft Corp., and Capt. George Haldeman of trans-Atlantic fame, flying a Stinson-Detroiter, Wright Whirlwind powered monoplane. The new record, made March 28-30 above the Jacksonville, Fla., beach, is 53 hr. 36 min 30 sec.

The two pilots were officially clocked off the beach with a total load of 6060 lb. on Wednesday morning at 7:37.40 Back and forth they flew over a 30 mi course at an altitude approximating 4,000 ft. The plane soon settled into steady flight and held it for the remainder of the day. On Thursday and early Friday choppy air currents were encountered, but these failed to effect the steady circling of the plane over



The Stinson-Detroiter monoplane in which Stinson and Haldeman set a new world's endurance flight record

the course. At 11.40.10 P.M. Friday the fliers landed, having broken by 1 hr. 13 min 15 sec. the former world record of 52 hr. 23 min. 11 sec. made by Johann Risticz and Cornelius Edzard in a Junkers plane in Germany last July.

Stinson and Haldeman landed with four or five gallons of gasoline still remaining in their tanks. They did not continue until this had been used, Stinson declared, because they did not care to risk a dead engine landing amid the crowds. Rules require that to be recognized, new endurance records must better the old by at least one hour's time, and the fuel carried had easily enabled Stinson and Haldeman to meet this requirement.

After the flight, Eddie Stinson said that the monoplane had averaged 85 m.p.h. in the test and stated that the mileage covered would have been enough to fly from New York to Dublin and return. He reported the weather very satisfactory, the choppiness being quite negligible in comparison with the stormy weather encountered above Lake St. Clair near Detroit where an attempt at the record was made early in March.

The following data was contained in a special report in AVIATION made by William C. Naylor, chief engineer of the Stinson Aircraft Corp.:

The plane used was a standard Stinson monoplane with the exceptions of brakes, exhaust ring manifold, side windows, inside trim, and one door. The plane was equipped with dual wheel control, dual rudder control, a 181 gal. cabin tank, and four 46 gal. wing tanks. The remaining fuel was carried in 5 gal. cans. The plane is the one which was used in the Spokane Derby.

Gasoline was pumped from cabin tank to wing tanks with a rotary pump, the carburetor was equipped with two exhaust heaters to improve economy, and the cabin was equipped with two exhaust heaters, one in front of each pilot.

Assuming the load to be the same as on the Detroit attempt, the loads were: 558 gal. gas, 3,348 lb.; 19 gal. oil, 147 lb.; water, 11 lb.; 38 gas cans, 95 lb.; blankets 10 lb.; Stinson 162 lb.; Haldeman 147 lb.; log and barograph 8 lb.; food 30 lb.; and the plane empty approximately 2,100 lb., making the total load approximately 6,060 lb.

A $5,000 prize was given the fliers after they landed their plane. This had been offered by the Jacksonville Junior Chamber of Commerce for a successful attempt.

World Speed Mark of 318 M.P.H. Established by Major de Bernardi

FLYING HIS Macchi M.52 seaplane at a maximum speed of 350 m.p.h. and at an average of 318.57 m.p.h., Maj. Mario de Bernardi, Italian flier, broke the world's speed record in a series of flights over the Lido course at Venice on March 30. The Macchi plane, the type used by the Italians in the Schneidar races, is powered with a Fiat 12 cylinder engine.

De Bernardi flew over the measured circuit eight times in this flight which eclipsed his former world's mark of 298 m.p.h. made over the same course Nov. 5, 1927. Carefully timed by officials appointed by the International Aeronautical Federation, he covered the 10 kilometer course in ever increasing speed until 350 m.p.h. was attained while flying with the wind. His plane was flown at an altitude of 155 ft.

The fuselage of the Macchi seaplane had been made thinner for the test. Furthermore, its floats had been lightened, it was better streamlined, and more than 20 sq. ft. of wing surface had been deducted. Landing speed was so increased by the reducing of the wing surface that further reductions were considered dangerous.

Maj. Mario de Bernardi is Italy's best known speed flier. Except for a few weeks last fall following the Schneider races and preceding his world mark of Nov. 5, Major de Bernardi has held the speed record since 1926 when he established a mark of 246 m.p.h. over the Norfolk, Va., course in the Schneider races of that year.

Manual of Flight Test Procedure Issued by University of Michigan

AS A step toward standardizing testing procedure and to perfect methods for determining with greater accuracy the performance of airplanes used in military, commercial, and naval aviation, the department of engineering research at the University of Michigan at Ann Arbor has issued a "Manual of Flight Test Procedure".

The manual is the work of W. F. Gerhardt, consulting aeronautical engineer and former chief of the flight tests research unit, materiel division, United States Air Corps, and Prof. L. V. Kerber, Guggenheim professor of applied aeronautics at the University of Michigan. Professor Kerber was formerly chief of the aerodynamics unit, United States Air Corps.

The manual embodies such subjects as: the general problem of flight testing, including production testing, preparation of the airplane for flight, actual flights, computation and reduction of data, research testing, improvement of design, and testing procedure.

Flight Operations Outlined

The bulletin tells of the preparation of a new plane for flight and the installation of navigation instruments and their calibration. Flight operations are outlined, including preliminary flight, airspeed calibration, check climb and cooling test, and operational characteristics—take off and landing, balance and stability, maneuverability, and control.

Mr. Gerhardt and Professor Kerber obtained permission to include in the new manual material resulting from research and experience during their official connection with the Air Corps.

The speed of the best rate of climb, the true rate of climb, high speeds, maximum angle of climb, engine revolutions, engine power at altitudes, minimum angle of descent, the airplane polar, and propulsive efficiency are among the various phases of testing procedure discussed.

This manual is intended to be of service to two types of readers. first, members of the air services not directly engaged in flight testing and others in the industry desirous of learning how test results may be obtained; and second, specialists in testing and designing, who may be able to contribute constructive suggestions based on their criticism of present proposed procedure.

Copies of the new manual are obtainable at the office of the director, department of engineering research, University of Michigan, Ann Arbor. The manual is priced at one dollar.

Western Judge Rules Low Flying Above Homes is Not Trespassing

LOW FLYING over a residential section does not constitute trespassing, according to a decision recently handed down in the Los Angeles courts by Municipal Judge Charles L. Bogna, in the case of People vs. Burdette Fuller and officials of the Aero Corp. of California. It is hoped that this decision will help to establish a precedent by which future commercial flying may be regulated, as it seems impossible in connection with most airports to either take off or land without flying comparatively low over nearby residential sections.

The Burdette and Aero Corp. of California airports were also charged with maintaining a public nuisance because of dust raised and blown across a public highway by the propellers of planes taxiing along the field. This charge was dropped when the airports in question spread thousands of gallons of road oil along the field runways thus eliminating all objectionable dust.

Circle Airway Connecting Scenic Spots of West is Being Planned

PLANS WERE recently announced in Los Angeles by officials of National Parks Airways, for a circle airway providing tourists with rapid transportation between all of the great scenic spots of the Western United States.

It is understood that six Wasp equipped Fokker Universals have been ordered for this service. The proposed air line would start at Salt Lake City and proceed to Yellowstone Park, thence northwest to Rainier National Park in Central Washington and along the Columbia River Highway, then south to Crater Lake National Park; southeast to Yosemite; Los Angeles; east to the Grand Canyon, and then back to Salt Lake City by way of Zion National Park. Service over the initial portion of this line from Salt Lake City to Butte, Montana, with stops at Pocatello, Idaho, and Great Falls, Mont., is expected to commence in early June, the line to be extended with the delivery of the new equipment.

Three Salt Lake City business men are backing this project, Alfred Frank being president, Phil J. Purcell, vice president, and S. F. Ballif, Jr., treasurer.

New Two Place Sport Monoplane Is Built by Whites' Aircraft Co

DESIGNED AND built by Whites' Aircraft Co. of Des Moines, Ia., a light plane of steel fuselage construction recently made its appearance. The plane, of monoplane parasol type with wing strut bracing, will be known as the "Whitey Sport". The power plant is the Anzani three cylinder 35 hp. engine fitted on a steel tubing mount.

The plane, which has a span of 25 ft. and a fuselage length of 16½ ft., is designed for two passengers side by side. Dual controls are provided, the engine is well cowled and streamlined, and the tail group is of all metal construction. A split type landing gear will be provided at the buyer's option.

The "Whitey Sport" was designed by Harold L. White and is the first of its type to be put on a production basis in Iowa. Three of the craft are to be shortly delivered.

Palmco Air Service Newly Formed At Middletown, O., Buys Waco 10

PALMCO AIR Service was recently formed at Middletown, O., to engage in passenger flying, cross country work, and instruction. A new Waco 10 was recently delivered to the new organization by the Embry-Riddle Co. of Cincinnati, distributor of that craft.

S. J. McAdow, Tom D. Palmer, Orrin Farnsworth, William Kincaid, and Tim Palmer compose the concern. George Wedekind, Embry-Riddle dealer, will act as pilot and instructor. The plane will be flown off the Middletown Municipal Airport.

Bach Aircraft Co. May be Moved To Portland, Ore., Says President

POSSIBILITY THAT the Bach Aircraft Co. of Santa Monica, Calif., builder of the two 10 passenger cabin monoplanes "Cascadian" and "Crusader" now in service for the West Coast Air Transport Co., might be moved to Portland, Ore., was recently admitted by L. Morton Bach, head of the concern. Mr. Bach inspected the Portland area a short time ago when he flew to that city on the trial runs of Cascadian and Crusader.

University of Minnesota to Offer A Four Year Aeronautical Course

AERONAUTICAL ENGINEERING training over a four year course leading to a Bachelor of Science degree is now being planned by the University of Minnesota at Minneapolis, teaching to begin in the fall In offering this course, Minnesota will be following the lead taken by New York University, Stanford and others.

Ore M. Leland, dean of the Minnesota College of Engineering and Architecture and school of Chemistry, has received offers from the naval and military departments of the government of discontinued equipment for ground training purposes. Part of this equipment, which includes several types of engines and land and seaplanes, has been brought to Minneapolis and additions will be received from time to time

The teaching staff includes men, who are well qualified to teach their various subjects, and these will be supplemented by others as the enrollment increases. K. J. de Juhasz, who was an associate professor in the Budapest Technical College in Hungary, is one of the instructors. He did original research work in power plants and high speed internal combustion engines when he held his former position in Budapest. Charles Boehnlein, another member of the faculty, studied under Professor Prandtl at the University of Gottingen during the past year, being in Germany about 14 months.

Other faculty members who will give aeronautical instruction are B J. Robertson, Frank E. Weld, and Carl McKay.

Daily Program is Arranged for Big Detroit Aircraft Show Next Week

ATTRACTIONS WILL be many at the All-American Aircraft Show to be held in Detroit, Mich., April 14-21. On Saturday, the day of the opening, people in the city and its vicinity will be pleasantly surprised by the broadcasting of music and announcement from a large plane carrying a soloist and five piece orchestra far above their heads. A special transmitter secured from the Department of Commerce will be used in this unique heralding of the show.

An airplane parade—a huge procession representing the world's newest transportation industry and including airplanes of all makes, sizes, and description—will also pass over the city on the opening day. At least 50 planes are expected to participate in the parade, which will be divided into military and commercial groups. These planes, of course, will be others than those on exhibition in Convention Hall, where the latest products of more than 40 manufacturers in 22 cities in the country, will be displayed.

Announcement also has been made that a colossal illuminated map of the world's airways will be shown at the exposition by the Department of Commerce, which has reserved 1,000 sq. ft. for exhibition purposes.

The following is a rough program of the week's activities:

Saturday: Official opening. Mayor Lodge's dedication of Aviation Week.

Sunday: Doors open from 2 P.M. to 11 P.M. Plane demonstrations at the airports.

Monday: Boy Scout Day. Scouts and school children admitted at reduced rates. Aviation dinner in evening under direction of H. H. Rice, chairman of the program committee. Members of Detroit area aero clubs to be in attendance. The evening will be observed as Industrial Night, the night's activities being under the direction of Burch Foraker, president of the Michigan Bell Telephone Co

Tuesday: Engineers' Day at which time members of the Society of Automotive Engineers will hold an aeronautics meeting and attend the show en masse. Service Club Night will be observed in the evening by members of 21 service clubs cooperating with the staging of the show.

Wednesday: Michigan Day. Junior Chamber of Commerce of Michigan will meet. Many delegates from Canada will be present and will parade up Woodward Ave. to Convention Hall. Board of Commerce Night will bring civic organization delegates together.

Thursday: Womens' Day. Mrs. Orra Hesld Blackmore, Detroit clubwoman, is in charge of activity which will bring together members of 87 womens' organizations in the city and vicinity. Men will cross the river to visit Canada and view air activity there.

Friday: Army and Navy Day. Maj. Floyd E. Evans, commander of the 107th Observation Squadron, Michigan National Guard, will direct the day's program. Brig Gen. William E. Gillmore, commanding officer at Wright Field, Dayton, O., will be the chief speaker at a special dinner in the evening arranged in honor of Army and Navy officers.

Saturday: Closing day dedicated to various fraternal organizations, such as the Masons, Maccabees, Odd Fellows, and others, which will take part in a special program.

Among those who will speak during the week are Edward P. Warner, assistant secretary of the Navy in charge of aeronautics; Maj. Herbert A. Dargue, Pan-American Good Will Flight commander, Earl D. Osborn, publisher of AVIATION, Porter Adams, N.A.A. president; Grover Loening, aircraft manufacturer; Col. Paul Henderson of the National Air Transport Co.; and Reed Landis, Chicago attorney and aviation backer.

Warn Pilots of New Illinois Radio Towers and Winds at Canyon Field

ATTENTION OF all pilots has been called to the fact that two 300 ft. radio towers 700 ft. apart are being constructed three and one-half miles south of Downers Grove, Ill., on Main St highway. Warning is also made of take offs from the Scenic Airway Field near Grand Canyon, Ariz., when the wind is from the north or northeast.

The radio towers will be painted alternate bands of black and white and will bear red lights on the tops and at the 100 ft. and 200 ft. levels. There will be no markings on the steel messenger cable stretched between the structures.

The trouble in take off from the Scenic Airways Field is caused by the air stream crossing the Painted Desert and deflecting upward on encountering the south rim of the Canyon. This results in a setting wind current or downward draft which forces a leaving plane down which reaches a point approximately four miles from the point of take off and directly into the wind.

To Produce Three Planes Weekly At New Lockheed Company Plant

THREE PLANES a week will be the production schedule of the new Lockheed Aircraft Co. factory recently acquired at the corner of San Fernando Rd. and Empire Ave., Burbank, Calif. A personnel of 50 men are now engaged in speeding up the construction of Lockheed planes, and it is thought that the schedule of three planes a week will be soon effected with more than 150 men employed.

A single order of 20 planes from Air Associates, Inc., of New York City was received recently, and with other orders now on the books this means that under maximum production the Lockheed output is under contract for the next 10 weeks at least. The order from Air Associates, calling for 1928 delivery on all planes, involves a contract value in excess of $200,000.

Ideco Beacon Towers are Used Extensively on Airways of U. S.

IDECO BEACON Towers are regular equipment on a great many of the important airways of the United States, according to a statement by the International Derrick & Equipment Co. of Columbus, O., and Torrance, Calif., manufacturer of these structures. Engineered and designed to resist heavy winds and storms, these beacon towers are protected against the weather by the Ideco hot dip galvanizing process and are said to be rust, fire, and lightning proof, essential requirements for towers of this type.

Heights vary from the short 20 ft. tower used on the deserts and plains to towers 87 ft. in height. The standard tower is 51 ft., but due to the topography of the site and other conditions additional heights are often required Ease of erection and transportation has been especially stressed.

For beacons located in isolated spots inaccessible to electric power, Ideco Beacon Towers having small houses built into the base are furnished for housing the electric power plant or acetylene tanks.

Standard beacon towers are designed for use with the various makes of standard electrical equipment. Where Neon lights and other fog and mist penetrating apparatus are used, the standard tower is furnished with special fixtures to hold this type of equipment.

St. Louis Air Board Will Present Lindbergh Medals While in Europe

A TOUR of inspection over European airways is to be made, it is reported, by the St. Louis Air Board this summer During the tour, the board will present silver medals, made in replica of the medallion struck off in St. Louis in commemoration of the Lindbergh flight, to King George of England, Albert, King of the Belgians, President Doumergue of France, and Ambassadors Houghton at London, Gibson at Brussels, and Herrick at Paris.

The delegation, which will sail from New York on June 22, already includes 50 members who have made reservations. Among them are Harold M. Bixby, president of the St. Louis Chamber of Commerce, and Harry Hall Knight, two of the original backers of the Lindbergh trans-Atlantic flight. The party will visit France, Belgium, Holland, and England, returning from Southampton July 5 Individual members also have arranged for side trips to Berlin, Constantinople, and other cities not included in the party itinerary.

Eddie Martin's Airport Made Stop On Route of Maddux Ford Service

EDDIE MARTIN'S Airport, Santa Ana, Calif., will in the future be a point of call for the Maddux Ford liners on the L.A.-San Diego run, according to a recent announcement by Eddie Martin. Since Santa Ana is the chief city between San Diego and Los Angeles it is thought that much business will originate at this point for transportation over the Maddux lines.

Eddie Martin's Airport is located at the junction of Main and Newport Blvd., three miles directly south of the town of Santa Ana. The field is 2040 by 1320 ft. and has an emergency field a mile long beyond the south boundary of the runway. The field has its greatest length in the direction of the prevailing wind which is southwest.

There are two hangars 58 by 76 ft., one 40 by 50 ft. and three 30 by 45 ft. on the field Twelve planes are housed in these hangars at the present time. There is a wind cone on the northeast corner of the field but no landing lights as yet. A drain has just been installed and the field is always in good condition.

Eddie Martin has recently taken a sub-dealership for the Eaglerock plane in Riverside and Orange counties and is now awaiting delivery of his first plane. Flying at the field is done by Eddie Martin, Johnnie Martin, and N. B Russell.

First Pursuit Group of Selfridge Field to Tour in East and South

BETWEEN 25 and 30 pilots from the First Pursuit Group, Selfridge Field, will tour the East and South late in April or early in May, Lieut. Col. Charles H Danforth, commandant of the post, announced recently.

The purpose of the tour, Lieutenant Colonel Danforth said, is to afford long distance cross-country practice. The flight will consume about a month, and the fliers, as far as possible, will stop only at Army Air Service fields. At the present writing, the itinerary is as follows: Columbus, O; Bolling Field, Washington, Langley Field, Va.; Fort Bragg, N. C.; Augusta, Ga.; Fort Benning, Ga.; Columbus, Ga., Monroe, La.; Fort Sill, Okla.; Fort Riley, Kan.; Chanute Field, Rantoul, Ill.; and back to Selfridge.

A comparison of maneuvers will be made between the Selfridge group and pilots of other fields, it was said. Possibly gun and bomb practice will be included in the program. Lieutenant Colonel Danforth will not accompany the group but will leave at about the same time on a tour of inspection of 43 landing fields in Michigan, Illinois, and Wisconsin, comprising the Sixth Corps area.

Prominent Companies Will Display Planes at New York State Exhibit

A NUMBER of aircraft companies have already stated they will have exhibits in the New York State Aircraft Exposition to be held in the Syracuse, N. Y., Armory April 30 to May 5 This period will shortly be officially proclaimed by Mayor Charles G. Hanna of Syracuse as "Aviation Week," it has been announced.

Among the prominent concerns which will display planes are Pitcairn Aviation, Inc., the Stinson Aircraft Corp., the Travel Air Mfg. Co., the Bellanca Aircraft Corp., the Curtiss Aeroplane and Motor Co., Inc., the Fairchild Airplane Mfg. Co., and the Advance Aircraft Co.

A total of 30,000 sq. ft. will be available for display purposes in the armory, and present indications are that the building will be taken to capacity by the exhibitors. Persons of world prominence in aeronautics have been invited to attend.

Robertson Aircraft Corp. Names St. Louis-Chicago Passenger Rate

WITH the discovery that there is a constant demand for aerial transportation between St. Louis and Chicago, the Robertson Aircraft Corp. of St. Louis has fixed a flat rate of $30 for the trip and $50 for the round trip. A Ryan Brougham, with accommodations for four passengers, is to be used in the service; another Ryan plane, furthermore, is to be ordered soon, it is said.

All records for passenger carrying on this St. Louis-Chicago air mail route were recently broken when a passenger was carried on every trip over a period of a week.

Materials of Construction

Continued from page 891

previous figure the formula upon which the chart is based is given at the top of the figure. In addition to I, the moment of inertia, the area A of the material, in the cross-section of a tube enters into the formula. Table 5 gives the area of the material in the cross-section of all commonly used tubes.

Fig. 44 is a chart for chrome-molybdenum tubes designed by the Johnson formula. As in the previous figure the full lines are for a restraint coefficient of one and the dotted lines for a coefficient of two.

Use of the Column Charts—Suppose we have computed the stresses in a steel tubular fuselage structure and wish to find what size tubes are required. Let us assume the fuselage is welded in which case we are allowed a coefficient of restraint of two (C = 2). The material is chrome-molybdenum for the longerons, and 1025 steel for the side truss members.

The first thing to do is to form a table as below which will be filled in little by little.

In the first column we list the location and number of the tube.

The second column is the maximum stress that the tube must carry.

The third is the length from center to center of joints.

The fourth column is the coefficient of restraint used in figuring the allowable loads. For welded fuselages a value of two is allowed. For pin-ended trusses a value of C = 1 must be used. In riveted construction the number of rivets per joint and the amount of material used to gusset the joint determine the allowable fixity. Customarily a value of C = 1½ is allowable. The designer may assume his own value but it must meet with the approval of the Department of Commerce. No value greater than two has ever been permitted in aeronautical work.

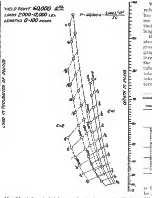


Fig. 44. Chart for steel tubes as short columns, 60,000

Design of Steel Tubular Structure

Member		Stress in Member	Length	C	Size		Allowable Load	M.S.
Upper Longeron	1	5000	50	2	Cr-Mol	1¼-.035	5180	.036
" "	2	1749	50	2	"	7/8-.035	1860	.06
Lower Longeron	3	[illegible]	[illegible]	2	"	1-.049	5900	.08
" "	4	1500	[illegible]	2	"	3/4-.035	2000	.33
Side Truss	5	1278	[illegible]	2	1025	7/8-.035	1420	.11
" "	6	1160	47	1	"	3/4-.035	1250	.085
" "	7	[illegible]	[illegible]	2	"	5/8-.035	[illegible]	1.82
" "	8	[illegible]	[illegible]	1	"	3/8-.035	1740	4.79

With the data of the first four columns before us we now refer to Table 3. Taking member No. 1 as an example it has 5000 pounds load in it and is 50 inches long. We can see from column 4 of Table 3 (Chrome-Molybdenum, C = 2) that if our tube is to be larger than 1-inch diameter the length of 50 inches brings it within the Johnson formula.

Referring then to Fig. 44 we place a ruler along the graduation marked 50 in. on the extreme right, and the 5000 lb graduation on the extreme left. Any of the dots of the nomograph which now fall above our rule will give a sufficiently large tube for this member. In this case either the 1¼-035 or the 1⅛-049 will satisfy our purpose. Which of the two tubes to use must now be decided. Unless other factors enter into the considerations the lightest tube should always be taken. Which of these two is the lightest may be readily determined from Table 5. The 1¼-35 has the lesser area and

Outside Diam.	B.W.G.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 4. I of hollow circles and tubes.

is therefore the lighter. On the other hand it may sometimes be preferable to use the heavier gauge but smaller diameter 1⅛-046 tube. Welding considerations may be the reason for this or possibly the necessity of keeping the tubes as small as possible at some joint where a fitting is to be placed. Then again if a tube is exposed the greater parasite resistance of the larger diameter tube must be considered.

In the case of member No. 2 the load is obviously small and a tube of 1-inch diameter or less may be used. This puts the tube in the Euler range. Referring to Fig. 42 we find the 50-inch mark on the length chart marked E = 29,000,000. Since in our case C = 2 we divide the required load 1749 by two obtaining 875 pounds and locate this point on the load scale. Placing our rule between the two points we find that ⅞-035 is just above it. This then is sufficiently strong for the design.

To find the allowable load for the tubing selected we place the rule on the proper length graduation and the dot representing the tube selected. Where the rule cuts the load scale is the allowable load. In the case of Fig. 42 as explained above the value read from the chart must be increased in proportion to the *C* used in the design. Thus for the tube just designed (50 inches long, ⅞-035 in. tubing) the load as read from Fig. 42 is 930 lb. Since our restraint coefficient is two the allowable load for this tube is 2 × 930 = 1860 lb. which is the value listed in column 6 of our table. The margin of safety (M.S.) is determined by dividing the allowable load for this tube by the stress in the tube and subtracting one from the answer. Thus for member No. 1:

M.S. = 5180/5000 — 1 = .036

Member 3 was designed from Fig. 44.
Member 4 was designed from Fig. 42. (E = 29,000,000)
Member 5 was designed from Fig. 42 (E = 28,000,000)
Member 6 was designed from Fig. 42 (E = 28,000,000)
Member 7 and member 8 were designed from Fig. 43 (dotted lines)

Seamless streamline tubes are formed from round tubes but they no longer possess the properties of the basic section. The column formulas of Figs. 42 to 44 may be used if an appropriate form factor is introduced. To be on the safe side a 15 per cent. reduction in the allowable load obtained by the use of these formulas is advisable. The value of *A* to

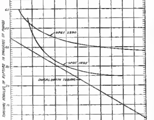


Fig 45

be used in these formulas is that of the basic round section. The value of I, the moment of inertia, that must be used is the minimum value of I of the newly formed streamline structure, that is the moment of inertia about its long axis.

Table 6 gives the size and gauge of the basic round tubes from which streamline tubing has been formed together with the area, minimum moment of inertia, and minimum radius of gyration of the drawn tubing. For long columns we may use the nomograph of Fig. 42 directly, not forgetting to reduce the allowable load 15 per cent. It will be noted that the middle scale of this nomograph is graduated for moments of inertia. As we know the length of our tube and the value of Imax from Table 6 we can read directly the allowable load. This load must be multiplied by .85 (the form factor, 100 less 15 per cent.) and then by our value of *C* for the design. For streamline tubes which are nearly always exposed to the air the value of *C* is invariably one as external trusses are usually pin-jointed.

In any truss some of the members must be in tension and some in compression. In the design of a fuselage structure all members are not compression members and thus designed by the column formulas, some are in tension and must be designed for this condition. The tensile strength of steel tubes commonly used is listed in Table 7. For mild carbon steel (1025) the values listed under 55,000, the ultimate strength of this steel must be used; for chrome-molybdenum steel the values listed under 90,000 must be used. As in the case of tubes

Outside Diam.	B.W.G.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table 5. Areas of tubes

designed by the column formulas we have a choice of several tubes all of which are strong enough to carry any given load. Many considerations, most important of which is the weight of the tube, enter into the selection. To aid in this choice the weight in pounds per 100 inches of tube is also listed in Table 7. If it is desired to know the weight in pounds of the completed fuselage structure this table of weights will greatly facilitate the calculations.

Table 7 is not a complete listing of all the tubes that may be used in the construction of a plane. If it is desired to find the tensile strength of a tube not listed we must refer back to Table 5 to find the area of the tube under consideration. This area times the ultimate strength of the steel being used will give the allowable tensile strength of the tube. To obtain the weight of a 100-inch length of the tube multiply the area by 28.33. Thus:

Weight of 100 in. of tubing = 28.33 × Area.

In the design of fittings and other portions of an airplane it is often necessary to figure the tensile strength of steel in sheet or bar form. This is done by multiplying the minimum cross-sectional area of the material by the ultimate tensile strength of the steel used in its construction.

Welding tubes weakens them considerably. While it is forbidden that a weld should ever be so placed that it is in tension or bending this may be gotten around in tubular construction by gusseting the joint thus putting the weld in shear. The Department of Commerce demands however that when a tube has been welded its allowable strength may be taken as only 80 per cent. of its calculated strength. Thus for welded trusses the values obtained from Table 7 must be multiplied by .80 to obtain the allowable strength.

In many places such as axles, tail skids, rudder posts, etc., on an airplane tubes are subjected to bending stresses. The modulus of rupture or allowable bending stress of steel tubes is equal to their ultimate strength in tension. The modulus of rupture for 1025 steel is 55,000 lb. per sq. in.; for chrome-molybdenum it is 90,000 lb. per sq. in., for nickel steel (2330) it is 125,000 lb. per sq. in.

To determine the required bending stress we use the ordinary bending formula:

$S = My/I$

where M is the bending moment in inch pounds.
y is the radius of the tube
I is the moment of inertia of the tube (Table 4)

Various sizes of tubing must be tried until one is obtained that comes quite near the allowable *S*, but this value must always be less than the allowable or equal to it. In some locations it will be found that 55,000 lb per sq. in. allowable stress will require an extremely large and heavy tube. In these cases it is preferable from a weight standpoint to go to a higher grade steel such as chrome-molybdenum or nickel steel.

When a tube is in combined bending and tension the total combined stress may not exceed the modulus of rupture or ultimate tensile strength of the steel. For 1025 steel this value is 55,000 lb. per sq. in.; for chrome-molybdenum steel it is 90,000 lb. per sq. in.

When the stresses are combined bending and compression the regular formula must be used

$F_t = f_b / f_t (F_b - F_c) + F F_c$

where F_b is the modulus of rupture
F_c is the yield point; i.e. 1025 steel = 36,000
Chrome-Molyb. = 60,000

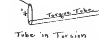
Torsion of Tubes.

In control systems a torque tube is frequently used. This tube must be designed to carry just simple torsion without any other stress entering into the calculations. The maximum stresses due to torsion are given by the formula

$f_s = M r / I_p$

where M is the twisting moment on the tube
r is the radius of the tube
I_p is the polar moment of inertia of the tube—which is equal to twice the ordinary moment of inertia as obtained from Table 4.

The allowable torsional stress in a tube may be obtained from Fig 45. The D/t ratio is the diameter of the tube selected divided by the wall thickness. It is advisable to select



Tube in Torsion
Fig. 46.

only such tubes as have a D/t ratio between 15 and 35. If we go below 15 the tube becomes excessively heavy for a given strength and above 35 the likelihood of local crushing becomes dangerous.

An illustrative example will be worked out. Let us figure what size tube is necessary to transmit a 700 pound load at the end of a 4-inch horn. The tubing is 1025 steel. The problem is illustrated in Fig 46

The twisting moment M = 700 × 4 = 2800 in. lb.

For a 1⅛-.058 tube: D/t = 1.125/.058 = 19.4

From Fig 45: f_s (all) = 33,500 lb. per sq. in.

$$f_s \text{ (req)} = \frac{2800 \times 1.25/2}{2 \times .02775} = 28{,}400 \text{ lb. per sq in}$$

M. S = 33500/28400 — 1 = .18

For a 1¼-.049 tube: D/t = 1.25/.049 = 25.5

From Fig 45: f_s (all) = 30,000 lb. per sq. in.

$$f_s \text{ (req.)} = \frac{2800 \times 1.25/2}{2 \times .03339} = 26{,}210 \text{ lb. per sq. in.}$$

M S = 30000/26210 — 1 = .14

Table 6. Properties of Seamless Streamline Tubes.

Basic Round Tube			Drawn Streamline Tube			
O. D.	Gauge	Area	Major Axis	Minor Axis	Ixx	Pxx
1 1/8	.058	0.1193	1.517	0.643	0.00608	0.2251
1 1/4	.035	.1336	1.685	.714	.00841	.2509
	.049	.1849			.01139	.2483
1 3/8	.035	.1473	1.855	.786	.01126	.2787
	.049	.2041			.01532	.2740
1 1/2	.049	.2234	2.023	.857	.02007	.2997
	.058	.2628			.02333	.2979
1 5/8	.049	.2426	2.193	.929	.02571	.3255
	.058	.2855			.02993	.3238
1 3/4	.049	.2618	2.360	1.	.03232	.3514
	.065	.3083			.03767	.0498
	.065	.3441			.04170	.3461
1 7/8	.049	.2811	2.528	1.071	.04073	.3807
	.058	.3311			.04664	.2708
	.065	.3698			.05168	.3759
2	.058	.3539	2.697	1.143	.05693	.4011
	.065	.3951			.06313	.2997
2 1/4	.058	.3994	3.035	1.286	.08187	.4527
	.065	.4462			.09088	.4513
2 1/2	.065	.4972	3.373	1.429	.12573	.5029
	.083	.6302			.15710	.4993
2 3/4	.065	.5483	3.708	1.571	.16859	.5545
	.083	.6964			.21104	.5509
3	.065	.5993	4.045	1.714	.22018	.6061
	.083	.7606			.27811	.6023

Either of these tubes will serve the purpose equally well but the deciding factor is their weight. From Table 7 we find that the 1⅛ inch tube weighs 5.51 lb per 100 inches, the 1¼ inch tube weighs 5.24 lb. per 100 inches. The choice would then be the 1¼ inch tube. This selection has the added advantage of having more circumference to which the horn can be welded more securely.

Perhaps it is desired to carry the investigation one step further and see if we can get an even lighter tube. Let us investigate a 1⅜-.035 inch tube. Its D/t is 1.375/.035 = 39.4. But we have just advised that a D/t of greater than 35 is not good design and therefore the 1¼-.049 tube is the most efficient solution to our problem.

It is often of interest to know the angle through which a tube will rotate when a torsional load is applied to it. This angle of twist in degrees may be obtained from the formula:

$\varphi = 57.3 ML / E_s I_p$

where M is the twisting moment
L is the length of tube for which torsional angle is desired.
E_s is shearing modulus of elasticity = 2/5 E which is 11,200,000 for 1025 steel; 11,600,000 for chrome-molybdenum steel.
I_p is polar moment of inertia

Combined Torsion and Bending

A member is often subjected to torsion when already in bending or bearing a direct stress or both. The shearing stress produced by the torsion will increase the normal stress of the bending and axial load. The maximum stresses, both shearing and normal, will occur on planes at 90 degrees to each other. These maximum stresses may be computed from the following formulas:

$f_{s\,max} = \sqrt{f_s^2 + f_n^2/4}$

$f_{n\,max} = f_n/2 + \sqrt{f_s^2 + f_n^2/4} = f_n/2 + f_{s\,max}$

where $f_{s\,max}$ = maximum shearing stress at the point considered
$f_{n\,max}$ = maximum normal stress at the point considered
f_s = shearing stress computed by formula in previous paragraph
f_n = normal stress = P/A — My/I when both bending and axial loads exist

Table 7. Weights and Tensile Strengths of Standard Round Tubes

Size		Weight per 100 in.		Tensile Strength*	
Diameter	Thickness	Steel	Durel	55000	90000
1/2	.035	1.00 lb.	.52 lb.	2810	4600
5/8	.035	1.30	.65	3570	5850
	.058	2.00	1.05	5480	9300
3/4	.035	2.33	.80	4320	7070
	.058	3.57	1.20	4063	11350
7/8	.035	2.62	.88	5080	8310
	.058	4.22	1.31	5180	13400
1	.035	3.01	1.07	5840	9550
	.049	4.15	1.48	8050	13200
	.058	4.20	1.74	9440	15450
	.065	5.41	1.33	10663	17300
1 1/8	.035	3.40	1.21	6590	10790
	.049	4.59	1.38	9110	14920
	.058	5.51	1.97	10690	17868
1 1/4	.035	3.78	1.35	7350	12030
	.049	5.24	1.87	00170	16630
	.058	6.15	2.20	11960	19580
	.065	6.88	2.30	13310	21800
1 3/8	.049	5.78	2.07	11230	18400
	.058	6.80	2.43	13200	21600
1 1/2	.049	6.33	2.28	12290	20106
	.058	7.30	2.60	14450	23620
	.083	8.30	2.97	16120	26400
	.083	10.47	3.74	20350	33220
	.098	11.80	4.23	23060	37800
1 5/8	.049	5.87	2.33	13340	21830
	.058	8.09	2.20	15700	22700
1 3/4	.049	7.42	2.60	14400	23600
	.058	8.73	3.12	16960	27750
	.065	9.75	3.20	18850	31000
	.083	12.32	4.40	23910	39160
	.095	13.38	5.00	27160	44450
1 7/8	.065	9.60	3.65	18210	29800
	.065	10.47	3.74	20330	33250
2	.058	10.03	3.60	19440	31810
	.065	11.19	4.00	21730	35500
	.083	14.16	5.08	27490	45000
	.095	16.11	5.76	31270	51200
2 1/4	.065	12.30	4.52	24540	40160
	.083	16.01	5.73	31080	50900
	.095	18.22	4.51	35380	57850
2 1/2	.083	17.80	6.36	34440	38700
	.095	20.06	7.27	39480	64550
2 3/4	.083	19.70	7.30	38250	62500
	.095	22.30	8.03	43640	71450
3	.095	24.56	8.73	47690	78000

*The tensile strengths given in this Table are the product of the tube areas by the unit stresses at the top of the column. No reduction has been made for rivet or bolt holes or for the efficiency of welded joints.

Example of the Use of Formulas for Bending, Compression and Torsion.

Determine the margin of safety of a 1-.049 inch tube of 1025 steel designed to carry the following loads

Direct compression	1000 lb.
Bending Moment	500 in. lb.
Torsional Moment	300 in. lb

For this steel F_b = 55000 lb. per sq. in. F_c = 36,000 lb. per sq. in.

For this tube size A = 0.1464 sq. in. I = 0.0166 in.

f = P/A = 1000/0.1464 = 6840 lb. per sq. in.

f_b = My/I = 500 × 0.5/0.0166 = 15080 lb. per sq. in.

f_n = P/A + My/I = 6840 + 15080 = 21,920 lb. per sq. in.

$f_s = Mr/I_p$ = 300 × 0.5/2 × 0.166 = 4,520 lb. per sq. in.

$f_{s\,max} = \sqrt{4520^2 + 21920^2/4}$ = 11,850 lb. per sq. in.

$f_{n\,max}$ = 21920/2 + 11850 = 22,810 lb. per sq. in.

D/t = 1/.049 = 20.4

From Fig. 45 the ultimate shearing stress F_s = 32,000 lb. per sq. in. for a D/t ratio of 20.4.

In shear M. S. = 32,000/11,850 — 1 = 1.70

In bending M. S. = allowable load/actual load — 1.

To find allowable stress:

F_t = 15080/21920(55000 — 36000) + 36000 = 49,100 lb./sq. in.

M. S. = 49,100/22,810 — 1 = 1.18

The margin of safety of the member is then 1.18, the lower of the two values.

Copyright Alexander Klemin

Continued in next week's issue

Curtiss Flying Service Will Offer Special 50 Hr. Instruction Course

THE CURTISS Flying Service, nationally-known operators of the famous Curtiss Field at Garden City, L. I., N. Y., has just completed plans for a new course of flying instruction, which will be of special interest to students who are seriously interested in obtaining the required Department of Commerce licenses as Industrial or Limited Commercial Pilots. This new course consists of 50 hr. flying instruction, following a carefully worked out plan that gives the student experience in all kinds of flying and on several different types of planes. In addition, there is a ground course, adopted from the well-known course of the Aviation Institute of America, and giving instruction on rigging, engines, navigation, air regulations, and other details that must be thoroughly familiar to an applicant for a pilot's license. This ground course will be given in the form of lectures, supplemented by pamphlets for home study.

Referring to the new course, M. M. Merrill, operations manager of the Curtiss Flying Service, said, "There is a greatly increased demand for flying instruction. We find that an increasing percentage of prospective students are interested in learning to fly, not merely for pleasure or as a pastime, but from the desire to follow flying as a profession. Such men, of course, desire much more training than they can get from the usual 10 hr. course. As a matter of fact, under the excellent prevailing regulations of the Department of Commerce, they must have at least 50 hr. of solo flying and be able to pass a fairly rigid examination before they can begin to work at this new profession. It is for this class of man that our 50 hr. course has been designed."

Midwest Airways is Distributor For Waco. Ryan, and Monocoupe

DISTRIBUTORSHIP OF the Waco, Ryan, and Monocoupe planes is now held by the Midwest Airways Corp. of Monmouth, Ill. Late in March, delivery was made on a new Ryan Brougham monoplane, and the first Ryan-Siemens engined Waco plane has also been flown from the factory and is now being demonstrated in the Chicago territory.

The Midwest company recently delivered new Waco 10's to the Aviation Service Flying Club, Chicago; Bruce L. McKinstry, Champaign, Ill., F. C. Anderson, Des Moines, Ia.; W. R. Williamson, Chicago, and Dr. M. R. Weir, Oak Park, Ill.

The Second Gordon Bennett Trophy Balloon Race

Continued from page 889

on. The contestants or their representatives are requested to be present at this operation. The total capacity of the balloon as measured must not exceed 2,200 cubic meters plus a tolerance of five per cent.

Art. 8. Helpers will be provided for moving the equipment from the shed to the place of inflation and for handling the balloons during inflation, the pilot or his representative being responsible.

Art. 9. In the absence of a subsequent announcement allowing a later time, all balloons must be in their designated places, ready to take gas, not later than 6 A.M., June 30th.

Art. 10. Inflation gas, consisting of city coal gas with a specific gravity not to exceed .45, will be furnished to the contestants without charge.

Art. 11. The competitors should carry at departure, their annual license.

Art. 12. The log and the landing certificate blanks will be provided by the National Aeronautic Association.

Art. 13. In conformity with the F.A.I. Regulations, the contestants are required to send a telegram immediately after landing to the following address: National Aeronautic Association, 910 17th Street, N.W., Washington, D. C. This telegram must state the time and place of landing and the name of the nearest city (Art. 123 F.A.I. Regulations). The flight record and the landing certificate, duyl made out, must be sent by registered mail within 24 hours after landing, (Arts. 123, 124 of the F.A.I. Regulations) to the President of the National Aeronautic Association, 910 17th Street, N.W., Washington, D. C. The contestants are advised to indicate the point of landing accurately by means of reference marks which can easily be located on the map which will be furnished each contestant.

Art. 14. In case of a landing in Canada the contestant is hereby instructed to promptly telegraph the Department of National Defense, Ottawa, Canada, requesting instruction for re-entry to the United States of Personnel and equipment.

Art. 15. Intermediate landings are prohibited. Conforming to the decision of the Bureau of the F.A.I. on January 11, 1926, attention of competitors is called to the following articles of the General Regulations.

Art. 129-Class A. A balloon is considered as stopped when any of its essential equipment is no longer carried along and supported statically by it. The time of stop shall be that given in the route log, which shall be in agreement with the landing certificate and with the readings of the control instruments. For duration records, see Art. 132. If a stop occurs at night, or out of sight of any inhabitant, the fact shall be mentioned in the route log. A contestant who is not in possession, upon landing, of his equipment, comprising the envelope, the basket and the net, if any is used, shall be considered out of the contest, and his performance will not be authenticated for purposes of records. Art. 130. Every voluntary stop shall be considered as a landing. The contestant shall enter all landings, together with their exact duration, in the route log. In the case of aircraft of Class A, an involuntary stop shall be considered as a landing only if its duration shall have exceeded fifteen minutes. However, all stops shall be entered in the route log. Contestants landing in the water and receiving help from a boat, will be declared out of the race without other penalty in accordance with Art. 128, F.A.I. Regulations.

Art. 16. It is prohibited to disembark either assistant or passenger.

Art. 17. Strict penalties will be provided for any act which might entail danger to the public, particularly throwing out full ballast bags, carelessness in starting, etc.

Art. 18. Each balloon must carry its national flag as well as the colors of the club it represents.

Art. 19. By the very fact that they have entered, the responsible contestants, constructors and pilots declare:

(a) That they are acquainted with these regulations and accept their provisions, as well as those of the F.A.I. Regulations.

(b) That they accept responsibility for any accident to things or persons which may happen to themselves, to passengers or to third parties, to their craft or to any other property, real or personal, either during preliminary trials or during the race, and that they release the Race Committee of the National Aeronautic Association of all responsibility in advance.

(c) That the National Aeronautic Association and the Contest Committee refuse in advance to accept any responsibility of this nature.

Roth-Downs Mfg. Co. of St. Paul Uses Travel Air in Radio Business

ANOTHER CONCERN that has entered the aeronautical field as an aid to business development is the Roth-Downs Mfg. Co. at 295 Como Ave., St. Paul, Minn. A Travel Air bearing the name of the company's product—Orpheus Radio, Master of the Air—is to be put in regular service shortly with the St. Paul Municipal Airport as operating base. It is the company's intention to use the plane in making quick deliveries to nearby points, to call on prospects, and to serve as a publicity medium.

A tour, in which the regular plane and several other Travel Airs will be used, is to be conducted during the early part of the summer as a means of popularizing the use of the "Master of the Air." Although the radios built by the Roth-Downs Mfg. Co. are sold throughout the United States, in parts of Canada, and in Mexico, the proposed tour will begin at St. Paul, travel east to the western part of Pennsylvania, turn south as far as New Orleans, head west across Texas, and finally begin the home stretch by going north through Colorado, Nebraska, and Iowa.

Los Angeles-Salt Lake Line Leads In Per Capita Air Mail Poundage

IN AMOUNT of air mail carried on a per capita basis in 1927, the Los Angeles-Salt Lake City airway led all other air mail routes, it was recently estimated by the Aeronautics Branch of the Department of Commerce. It was stated that more than one-ninth of a pound of mail was carried for every resident along the route.

For each thousand persons in the trading areas along the airway it was shown that 119.4 lb. of air mail was produced or received. This figure is nearly four times the amount carried on the Pueblo-Cheyenne route, which with 33.1 lb. per thousand persons rated second highest. Third highest mark went to the San Francisco-Chicago airway with a mark of 32.1 lb. More than 30 lb. was also carried by the Dallas-Chicago route and Chicago-New York route.

Statistics of the transcontinental route from New York to San Francisco show that the western half led during the last half year in per capita air mail, while the eastern half led in poundage carried.

The Loening Cabin Amphibian

Continued from page 888

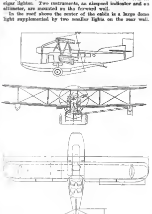
black hull and black cowling at the top of the cabin. The wings and tail surfaces are of orange with black struts and bracing members. All external bracing wires and fittings are either of polished duralumin or nickel plated steel. These polished surfaces include landing and flying wires, wire spacers, fairing where the controls come through the wing, steps and handles on the sides of the hull, window frames, etc. The finish resembles that of a yacht, and the colors are such that the plane can be distinguished at a considerable distance.

Doors are provided on each side of the cabin, with corrugated steps on the hull and handles on the sides to facilitate entrance. Though the doors are quite high, the roof of the cabin above each door slides up to increase the head room when entering or leaving the plane. Unlike the doors on many planes, these are of heavy construction resembling an automobile door. The hinges are at the front so that in the event of being blown open in flight the doors will be closed by the airstream. The interior of the cabin is very roomy, six feet long, four feet wide, and five feet four inches high.

The Loening Cabin Amphibian in flight

As the body is mounted directly on the hull, the floor of the cabin is below the level of the deck of the hull. Extending across the cabin, the floor is not flat but has a step of about six inches at each side. However, this does not affect the comfort of the passengers as the seats are mounted above this step and if desired it can be used as a seat for extra passengers. The interior finish, though conservative in color, is quite lavish. The upper walls and ceiling are upholstered in buff cloth while the lower portion of the walls, below the level of the windows, is finished in natural saddle leather. The floor is covered with a buff colored carpet to match the walls and ceiling. All fittings are nickel plated and walnut trim is used around the windows. These windows are of triplex glass and extend the length of the cabin, giving unobstructed vision to the sides. In addition, the roof above each door slides back, giving some vision upward. (This is primarily to increase the head room when entering or leaving.) The sliding roof in combination with the side windows permits almost any kind of ventilation desired. The side windows operate with a mechanism similar to that used in a closed automobile. They slide vertically. An exhaust heater is provided for cold weather. This is controlled by a shutter in the cabin at the front near the floor and in accordance with the trimming of the cabin, the shutter is of polished aluminum. Four comfortable seats of steel tubing covered with heavy upholstery are provided. Each of these seats is mounted on a swivel so that the occupant may swing the seat into any desired position. However, the seats have no tendency to turn of their own accord and will stay put in any position. In the center of the cabin is a mount for a collapsible table normally carried in the tail. This table can be used for bridge, buffet lunch, etc. At the front is a folding desk of walnut placed so that it can be easily reached from either of the two forward seats. Magazine racks are also provided, and at one side of the cabin is an automatic cigar lighter. Two instruments, an airspeed indicator and an altimeter, are mounted on the forward wall.

In the roof above the center of the cabin is a large dome light supplemented by two smaller lights on the rear wall.



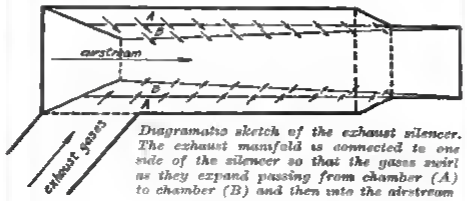
Three view drawing of the new Loening Cabin Amphibian.

A door in this rear wall leads to a small compartment used as a lavatory. Round windows are provided at the sides and in addition there is a ventilator in the roof. At the rear of this compartment is a door leading to the tail of the plane where no load is carried, the door being mainly for inspection purposes. The forward part of the cabin, which might be called a separate compartment, as it is narrower and its floor is at a slightly higher level than the main cabin, is planned to be used for small personal baggage. At the top of the forward wall of this compartment is a triplex glass window on hinges. This window is directly behind the pilot's head and can be opened for communication between the pilot and the passengers.

Except for being moved further forward, the cockpit of the Cabin Amphibian is almost identical to that of the OL-8, except perhaps for the finish. The cockpit of the commercial

plane is finished in black enamel and black leather with nickel plated or polished duralumin controls and fittings. Black leather life preserver cushions are provided, while at the left side of the cockpit there is a leather pocket for maps and papers. An aluminum instrument board finished in black enamel is provided. It is laid out with the flying instruments in a group at the top, and the engine instruments below. On the left is a booster magneto which unlike most others operates with a push-pull mechanism. The handle is pulled out by hand, while a ratchet pulls it back. On the right side of the cockpit is an indicator showing the position of the retractable landing gear, whether up or down, as well as the crank for raising or lowering the landing gear. Below this is a hand wobble pump and behind is a wheel for adjustment of the stabilizer.

All instruments and controls are within easy reach of the pilot, the wheel control hiding practically none of these. Rudder pedals are provided and on this first plane Bendix brakes were installed. The brake pedals are each next to the rudder pedals so that the foot can be placed on either the brake or rudder pedal, or both. From this forward location the pilot



Diagramatic sketch of the exhaust silencer. The exhaust manifold is connected to one side of the silencer so that the gases swirl as they expand passing from chamber (A) to chamber (B) and then into the airstream

has excellent visibility, besides being in a position for such servicing operations as fueling up, anchoring, mooring, etc. The pilot can see the wheels of the landing gear from the cockpit. In addition to this great assistance when landing, he can plainly see whether or not the retractable wheels are drawn up. However, an indicator in the cockpit is now provided as standard equipment to show the position of the wheels without looking over the side. It is stated by the manufacturer that these planes have often made successful land landings with the wheels up, but the desirability of this maneuver with a number of passengers in the cabin is questionable.

Thirty-six inch wheels and eight inch tires are provided as standard equipment. On the earlier amphibians smaller tires were used but it was decided to have over-size tires for operation in muddy fields. Wheel brakes were mounted on this first model but will be optional with the purchaser. The wheels are mounted on frames which are drawn into a recess in the hull, reducing air resistance and minimizing the possibility of the landing gear being fouled by driftwood or floating debris. The tail skid employs rubber discs in compression to absorb the shock. It consists of a steel tube pivoted at front, with the shock absorber in the rear. The nut is housed in a reinforced sheet which can take the tail load if necessary.

The air-cooled Pratt & Whitney Wasp engine is mounted on a bed supported from the hull as well as from the body of the plane. The engine drives a nine-foot diameter, three-blade Standard Steel propeller. It was necessary to have a three-bladed installation to obtain sufficient clearance between the propeller and the hull. An Eclipse inertia starter is provided as standard equipment, as well as an automatic fire extinguisher, generator, and battery. A dual fuel system from the 140 gal. tank in the hull below the pilot is provided. An engine driven pump draws the gasoline directly from the main

tank and a hand wobble pump is provided for emergencies. It has been stated that this dual pump installation with no gravity tank has proved the most reliable, being easy to maintain as well as foolproof. The exhaust system includes a muffler or silencer. It consists of a collector ring behind the engine connected to a single manifold extending to a muffler mounted on the center section of the upper wing.

The muffler unit is of the Venturi type, consisting of three concentric cylinders, the inner two perforated, and the exhaust gases entering on one side, causing them to whirl at the same time as they expand. The innermost cylinder, which

Side view of the Loening Cabin Amphibian on the water.

tapers and is therefore really two truncated cones, produces the Venturi effect because of its taper. The gases pass from the chamber between the outer two cylinders to the one between the inner two cylinders and thence inside the inner cylinder, expanding and reducing the noise and flame when passing through the holes from one chamber to another. The Venturi sucks the gases through the system and is said to have increased the speed of the Wasp engine on the ground from 1630 r.p.m. to 1660 r.p.m. This muffler is above the slipstream and far from the cabin, reducing the noise to a minimum. To reduce the noise further, the cabin walls are padded with balsam wool. A heater of the "muff" type is also included in the exhaust system. It consists of a sheet of metal or "muff" wrapped around the exhaust manifold. An opening on one side takes the air where it comes in contact with the manifold and then passes through an opening on the other side which is connected to a pipe leading to the cabin. The "muff" is in contact with the exhaust pipe for only about three inches but is said to give a constant current of air to the cabin at about 75 deg. F. on a moderately cold day. A shutter of the rotary type, which really forms part of the engine cowling, is provided to control the engine temperature.

Below the engine mount at the front of the body is a compartment with ample room for about 300 lb. of baggage. It is 26 in. wide, 24 in. long, and 54 in. deep, extending down to the bottom of the hull. In the front of this compartment is the case for the storage battery used for starting, lighting, etc. Above it is a bracket for the starter handle for emergency use. On the left side, just behind the door to this compartment is a small compartment containing a collapsible anchor and anchor rope, with most of the rope carried in the hull. Above this is a nickel plated cleat for fastening of anchor rope.

The construction of the Loening Amphibian was described in AVIATION of Oct. 24, 1927 and therefore only a brief synopsis will be given here. The hull is of composite construction, using wood members held together by metal fittings. The frame is covered with sheet duralumin. Bolts are used ex-

cisively for this construction. Spruce members are built up into longitudinal girders of the Warren truss type. They are reinforced by lateral bulkheads dividing the hull into water tight compartments. Unlike some of the earlier designs, the nose or bow is fitted with a bumper which also tends to streamline the hull. The wings are of two-bay design with N struts and polished streamline wires for interplane bracing. They are fabric covered with wood spars and metal ribs. The spars are of solid spruce, rectangular in section, while the ribs are of "Alclad", a non-corrosive duralumin product. Glue is avoided because of salt water. The wings are wired for navigation lights. The tail surfaces are of composite construction and, unlike the other Loening planes, an adjustable stabilizer, triangular shape, is used. The leading edge of the stabilizer is adjusted by a mechanism controlled by torque rods driven through bevel gears from the hand control in the cockpit. This gives the stabilizer a range from zero to plus five degrees. The other surfaces are controlled by cables. Horizontal surfaces are fabric covered while both vertical surfaces are covered with sheet duralumin over a wood frame. Unlike the rudder, the elevator is not balanced. Both rudder and elevator are of high aspect ratio and of large area.

The specifications of the Loening Cabin Amphibian as supplied by the manufacturer are as follows:

Span, overall	45 ft.
Length, overall	34 ft. 8½ in.
Height overall on wheels	13 ft. 2 in.
Chord of wings	6 ft
Wing area, including ailerons	504 sq. ft
Airfoil	Loening 10A
Stabilizer area	39.2 sq ft.
Elevator area	28 sq ft.
Vertical fin area	15.8 sq ft.
Rudder area	17.4 sq ft.
Weight empty	3400 lb.
Pay load	1200 lb.
Disposable load	2000 lb.
Gross weight	5400 lb.
Engine	425 hp. Wasp
Power loading	13.9 lb. per hp.
Wing loading	11.75 lb. per sq. ft.
High speed	120 m.p.h.
Landing speed	50 m.p.h.
Ceiling	14,000 ft.
Range at cruising speed (140 gal.)	650 mi.

Appropriation of Funds for Two Dirigibles is Asked by President

PRESIDENT COOLIDGE has recommended to Congress that funds be appropriated for the construction of two dirigibles, authorization for which has already been granted. Congress last year made $200,000 available to begin work on one of the rigid airships, but the money was not spent because the Navy Department could not obtain bids which came within the statute forbidding government construction on a cost plus basis.

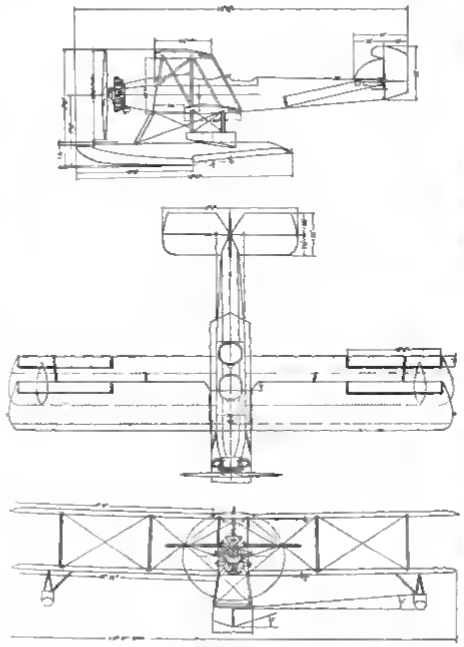
The suggestion of the President was that the Secretary of the Navy be authorized to contract for the construction of the two ships to cost not more than $8,000,000. The budget this year recommended an addition of $1,800,000 to the $200,000 already available. The recommendation would enable the Navy Department to use this money to start on both ships as it has been advised that one ship would cost $5,000,000 but two could be constructed at the same time at a cost of $8,000,000. Bids are to be re-advertised by the Bureau of Aeronautics.

The Curtiss "Fledgling"

Continued from page 867

handy compartment for tools, etc. Radio apparatus may be installed behind the rear seat, while the floor has a triangular opening for bomb sighting. Bombs are carried below the lower wing on each side of the fuselage, as on the standard military observation planes.

The ailerons and rudder are provided with a push rod mechanism while the elevators are actuated by cables outside the fuselage. The ailerons, which do not extend to the wing tips thus giving them a rectangular plan form, are attached by four hinges to false wing spars. Long, narrow strips of sheet metal on the upper surface cover the gap between the aileron



Three view drawing of the Curtiss "Fledgling".

and the wing. Only the lower ailerons are connected directly to the control system with a streamline strut between the trailing edges of the ailerons on each side. Where the aileron control tube comes through the wing, the fairing is transparent to facilitate inspection. The horizontal stabilizer is controlled by a hand wheel at the left of each cockpit. The stabilizer hinges about its leading edge and has attached to it, just in front of the elevator hinge, a vertical tube extending above and below the stabilizer. This tube is contained partly inside the vertical fin and partly in the fuselage. Streamline bracing wires for the horizontal surfaces are at-

tached to it so that when the stabilizer adjustment is actuated, the tube and external bracing wires move together as a unit.

The stabilizer position is controlled by a screw mechanism. It can be adjusted in flight, while the vertical fin can be adjusted only on the ground. Control mechanisms have ample bearing surfaces lubricated by Zerk fittings. All control surfaces are constructed entirely of steel tubing covered with fabric. The surfaces consist of large tubes taking the main loads with smaller diameter tubes to give the proper shape. The large tubes are faired with sheet metal welded in place and beat to present a smooth surface for the fabric. The vertical tail surfaces are designed to withstand a loading of 30 lb. per sq. ft. while the horizontal surfaces are designed for 35 lb. per sq. ft.

By the removal of six bolts the engine mount is quickly detachable. The mount consists of six steel tubes braced by two cables at the bottom and all attached to a mounting "ring" of two sheets of duralumin with a layer of laminated wood between. The Wright Whirlwind engine, with Scintilla ignition and Stromberg carburetor, is fitted with bayonet type exhaust pipes. An Eclipse inertia starter is provided, as is also a Curtiss Reed type R propeller of 9 ft. diameter and 5 ft. 9 in. pitch. No spinner is used. Standard equipment includes a Phister fire extinguisher.

A split type landing gear is used, with the wheels hinging about the mid-point of the bottom of the fuselage and compression members extending to the upper longerons. These members are attached between the cabane struts with the in-

The Curtiss "Fledgling" fitted as a seaplane in flight

ternal fuselage members carrying the load to the lower longeron. The tread between the wheels is 7 ft. 3 in. and the landing gear is placed so that the angle between the center line of the wheel (perpendicular to the thrust line) and the line from the wheel to the center of gravity is 18 deg. Rubber "doughnuts" or compression discs, in combination with an oleo mechanism provide the shock absorber unit having a ten-inch travel. The undercarriage was designed with a load factor of seven. The tail skid is steerable and uses rubber discs as the shock absorber mechanism.

For use as a seaplane, a single main float and wing tip floats entirely of wood are provided. The main float is of single step design with flat sides, flat top and a straight V bottom. The wing tip floats have crowned decks and are more streamline than the main float which appears somewhat cumbersome because of its wide beam and shallowness. The main pontoon is built up of mahogany plywood attached to a wooden frame with brass screws. The plywood is covered with copper nails clinched over to reinforce the plys. Lateral bulkheads divide the float into water-tight compartments besides acting as part of the internal structure. The float unit was designed to have 93 per cent. excess buoyancy. Tests as a seaplane were made at the Naval Air Station, Rockaway Point, Long Island, N. Y.

The specifications for the Curtiss Fledgling are as follows:

Length	26 ft. 9 in.
Height	10 ft. 4 in.
Span, both wings	39 ft. 1 in.
Chord, both wings	5 ft. 0 in.
Wing area including ailerons	365 sq. ft.
Airfoil	C-72
Stagger	28¾ in.
Sweepback	none
Aileron area	37.2 sq. ft.
Stabilizer area	22.5 sq. ft.
Elevator area	22.5 sq. ft.
Vertical fin area	5.2 sq. ft.
Rudder area	12.2 sq. ft.
Weight empty	1989 lb.
Disposable load	711 lb.
Weight loaded	2700 lb.

To Hold International Aeronautical Exposition at Berlin Oct. 7 to 28

FROM OCT. 7 to 28, an International Aeronautical Exposition will be held in Berlin, Germany. The exhibition will be managed by the National Association of the German Aviation Industry in cooperation with the Exhibition, Fair, and Tourist's Office of the City of Berlin. This feature, which will draw numerous visitors from all over the world, will be called "Ila 1928", the abbreviation for Internationale Luftfahrt-Ausstellung.

The 1928 show is to give a survey of the progress made since 1911, and furthermore, it is intended to exhibit non-military airplanes and equipment only. Attention will be paid to the development of small planes with light engines. The statistical section will show the development of flying in all countries, with special consideration given to the organization and equipment of flying fields.

As the Ila 1928 is to be an international show, industries of all countries have been invited to participate, and it is believed that a number of American manufacturers will send products to Berlin. Application for exhibition space may be made to Internationale Luftfahrt-Ausstellung Berlin 1928 Blumeshof 17. The space rent is around $6 per 10 sq. ft. with large allowances if desired. Rent for display of supplies and accessories will be about $8.50 per 10 sq. ft.

Waco Airplane Owned by Dennison Airport Flying Club, Boston, Mass.

FORMED TO promote the science of aeronautics and to help members become pilots at cost, the Dennison Airport Flying Club is now active in Boston, Mass. A new Waco plane has been purchased by the organization from the Dennison Airport Corp. to be used for both pleasure flying and instruction.

Officers elected by the club at its formation are Dr. Edward B. Ormsby, president, Charles Ruske, vice president, Gerald H. Mitsch, secretary, and Edward Rossi, treasurer.

Besides the regular members who aim to obtain the pilot's license, are honorary members and associate members interested in furthering the activity of the club.

Side Slips

By ROBERT R. OSBORN

We think it was Heywood Broun, esteemed columnist of The New York World, who said "Fame is as fleeting as a ferry-boat shoe shine." In watching Colonel Lindbergh's continuously increasing popularity we were beginning to think that he had proven the exception to the rule and that his fame would be not diminished, but increased, with time. However, his recent attempts to hide from the public eye appear to have broken the charm and the man-in-the-street is already a little hazy as to his accomplishments and is beginning to refer to him as Lindbog, Lindenberger or countless variations between these limits.

On the basis of these indications and past performances in the decline and fall of various public idols, we prophesy news items something like this along about 1935—"Among the guests was Carlos Linderberg, the young Italian. It will be recalled that he achieved quite a bit of fame a few years ago for his invention of a fuelless motor, with which he and Roger Q. McChamberlin attempted to break the world's endurance record in a Curtiss JN4-H. At the time he was an ensign in the Naval Reserve."

• • • •

In Illinois a candidate for Congress has purchased an airplane and is using it in his campaigning. He says it to hop from city to city to fulfill numerous speaking engagements. In the interests of safety we hope he has better air control than the average congressman.

• • • •

As every newspaper we look over nowadays has an item or two about some new type of plane being tested in Canada or New England prior to being taken on the Byrd expedition to the South Pole, we have reached the conclusion that there will be a serious shortage of aircraft in the United States during 1929. Therefore we offer the suggestion that the remaining dozen or so airplanes be taken along too, and that the air races for 1929 be held at the South Pole.

• • • •

An editorial in a recent issue of a New York paper states—"The more the element of safety can be increased the more will the public be likely to regard dirigibles favorably as mediums for passenger travel."

There's discernment for you!

• • • •

A letter published in Paris, from Lehrix, who, with Costes, has been making an extended tour of the Americas in their Breguet biplane, states that Mayor Thompson of Chicago, whom they met in New Orleans, was very "sympathetic". It might be well to advise any English aeronautical visitors to these shores in the future that New Orleans is about the safest place for them to meet Mayor Thompson of Chicago, and even at that, either the mayor or the visitors are likely to be in need of some real sympathy after the meeting.

• • • •

"Colonel Lindbergh, according to one of his best friends, is finished with women who want to kiss him." In other words, he is finished with women.

• • • •

Mr. Russell Crouse, columnist of the New York Evening Post said in a recent issue "A San Diego school has a class in parachute jumping. Students who fail to pass the final examination probably don't bother to come back". On the other hand, those who do well in their studies probably have many pleasant openings, have things coming their way "pretty soft" and make many fine contacts.

FOREIGN NEWS

By Special Arrangement with the Transportation Division Bureau of Foreign and Domestic Commerce

Foreigners Eligible for Afghan Service

There is no opportunity for foreign airplanes and aviators to enter into the air service of Afghanistan, according to a recent statement made by King Amanoullah I. of Afghanistan on his recent visit to Paris.

The Air Service of Afghanistan is at the present in the hands of Russian and German aviators, the Air Service between Bonkhara and Cabeul being organized by Russians and the planes used being German Junkers.

Ten pilots are in the service engaged by the Government of Afghanistan, while 25 young Afghanians are at the present in the aviation school of Moscow. The colonel in command of the first escadrille of Afghanistan was educated in the Red-Russian army.

To Open Milan-Munich Service

Service is shortly to be opened by the Avio Lines Italiana connecting Milan with Munich, it is reported. This journey is some 225 m. by air.

Flights between these two cities are quite difficult, it is said, because planes flying north from Milan, which lies 900 ft. above sea level, must gain height quickly in order to cross the Alps towering 12,000 ft. above the plains. The return from Munich, however, is not as severe; for the latter city is 3000 ft. above sea level and the mountains, furthermore, do not rise as abruptly as on the southern side.

Europeans Plan Score of Flights Here

A survey recently completed in Paris showed that 10 projects are under way in that city for flights to America. With at least that many others in preparation elsewhere in Europe, the total number of westward trans-Atlantic flights contemplated for 1928 approximates 20.

The feeling is strong in Europe that a westward flight will be accomplished this year, since a year of study of the problem has intervened making such attempts far less haphazard.

Airplanes May Enter Uruguay Duty Free

Airplanes and equipment will be admitted into Uruguay free of duty by a decree issued recently by that government, reports Commercial Attache Clarence C. Brooks, Montevideo, Uruguay, to the U. S. Department of Commerce. Such planes must be re-exported within six months however, the decree states, and must come in under bond.

To Transfer Rohrback Construction Work

With the treaty of Versailles restrictions against building large airplanes cancelled, the Rohrbach Metal Airplane Co. located at Copenhagen, Denmark, is to be discontinued, it is reported. The company's Berlin factory will now continue the construction of these planes.

Canadians Plan Service to New York

Canadian Transcontinental Airways of the City of Quebec has applied for a contract for a tri-weekly air mail and passenger service between Ramouski, Que., Montreal, Ottawa, and New York City. Operation of the new line is to begin this summer, it is said.

British Plan Weekly Service to India

Sir Samuel Hoare, English secretary of state for air, recently stated that the British Government plans to start the world's longest civil air route this year—a weekly mail service to India taking letters to Delhi in seven days and to Calcutta in nine.

AIRPORTS AND AIRWAYS

Boston, Mass.
By Daniel Rochford

Capt. Horace N. Hessen, U.S.A. airport commander at Boston since 1925, has left Boston for duty in Texas. He was tendered farewell banquets by the First Corps of Cadets, the New England Air Corps Reserve Officers Association, the Crosscup-Pishon Post of the American Legion, and the Boston Chapter National Aeronautic Association Resolutions praising his record at Boston in training reserve pilots were forwarded to Washington by all groups Lieut. Donald Duke,

Massachusetts Institute of Technology at Boston recently dedicated its new Daniel Guggenheim Aeronautical Laboratory Full equipment will be installed in the edifice for the beginning of the fall term

former chief of the airways section, succeeded Captain Hessen as airport commander.

Lieut. Richard E. Cobb flew to Washington from Boston recently in 205 min. and flew back non-stop in 310 min. with Maj. Ira Longanecker, new chief of the Army Information Section and former Corps Area air officer at Boston. A Curtiss Falcon with a D-12 engine was used.

Boston commercial planes made seven trips to photograph the steamship Robert E. Lee which grounded off Plymouth, Mass., Boston-bound from New York in the high seas and fogs.

The New England Council, a sort of super-Chamber of Commerce for New England, plans to hold its second aviation conference at Boston the day before Memorial Day. Plans are still tentative but some sort of flying show will be held between Boston Airport and Dennison Airport at Atlantic on Memorial Day. The conference is to stress airports.

Oakland, Calif.
By W. R. Davis

Activities at the Bay Farm Island Airport have been on a steady increase since the completion of the hangars. Some 24 planes are now in storage in the two units. In February, 2,031 passengers were carried on sight-seeing trips from the field, it was recently reported.

Capt. E. V. Rickenbacker expressed great interest in the grass covered 7,000 ft. runway from which the Dole flights to the Hawaiian Islands were started last fall. Where once was dust and dirt, there now is rolled gravel, green grass, white fences, two enormous hangars, a beacon light, and an administration building. Not the least of these is the Pilot's Club, where indoor barrack-room looping can be indulged without fear of the Department of Commerce!

Another old-time flier to drop in at the field was Earl T. Ovington, whose Bleriot monoplane was a familiar sight at aviation meets in the East 17 yr. ago. Ovington is commodore of the Santa Barbara Aero Club and is still flying.

Flight tests of the new Comet radial engine, manufactured by the Johnson Tool & Gear Co. have been so satisfactory that 24 of the engines are being put into immediate production. Joe Barrows, of Pacific Coast Air Service, flew the first engine 60 odd hours without a skip.

Lieut. G. R. Pond recently flew the Thaden all-metal monoplane to the summit of the Sierras and back, part of the time in blinding rain and snow, with six passengers. The Pratt & Whitney Wasp ran throughout without a hitch.

Chicago, Ill.
By H. H. Slawson

Rumors have been current that certain interests in Chicago have been discussing with some railroad the possibility of establishing a joint railroad-airplane route from the eastern seaboard to the southwest. An unofficial meeting has been held, it was learned, at which the possibilities of such a service were discussed. One report says the plan suggested that passengers be carried by rail as far as Ohio and that airplanes pick them up there and take them to certain points in Texas, thus saving 15 to 20 hr.

Representative Melvin K. Maas of Minnesota stopped at the Chicago Municipal Airport recently on an airplane flight from Washington to his home.

The Morrison Hotel, one of the Chicago loop's tallest skyscrapers, is to be the site of the new Lindbergh Beacon, it has been announced from the city hall. The light has been donated by Elmer G. Sperry, president of the Sperry Gyroscope Co. of Brooklyn, N. Y., with the provision that Chicago mount and maintain it. The light will have a 63 in. lens, of several billion candlepower and at full strength will cast a beam of 1,000 candlepower per square millimeter, or 100 candlepower brighter than the sun as viewed from the earth at noon on a clear day. It will be visible 250 mi. An appropriation of $20,000 has been recommended by a city council committee, for the erection of the beacon tower atop the hotel. Colonel Lindbergh will be invited to the opening ceremonies.

Garden City, L. I., N. Y.
By M. Brown

Colonel Lindbergh has been a frequent visitor at Curtiss Field, due to the many business trips he has been making in the east, and his Ryan monoplane may often be found in a Curtiss hangar.

Capt. Rene Fonck, French war ace, before his recent return to Paris spent an entire day inspecting the "Ville de Paris", which has been transferred from the Sikorsky to the Waco hangar. His aide, Captain Crete, will remain in this country during his absence. Captain Fonck is planning to bring a small two-place Morane monoplane back with him when he returns early in May.

The Bellanca in which Chamberlin will again attempt to break the endurance record, is not yet ready, but work on his "fool-proof flivver" has gone ahead in spite of his absence on a lecture tour, and the plane will be put on the market

soon. Retail delivery of orders will be made sometime around the middle of May. The plane under construction is dual control. Contrary to reports, it is to be powered with neither a Siemens nor a Cirrus engine. The six cylinder, air cooled engine which will be installed is being manufactured in this country, but no definite information about it is now available.

It is said that Roger Q. Williams will be co-pilot with Cesare Sabelli, Italian war flier, in a New York-Rome trip this May, the flight to be made in a Bellanca plane now under construction.

Ehrhardt Junkers, 19 yr. old, and scion of the famous German family who make the all-metal Junkers planes, is working hard every day at Curtiss Field. While here, he is going to take flying instruction from Curtiss Service, and learn to speak English. His sister, Miss Herta Junkers, is in this country at the present time, also.

Rock Springs, Wyo.
By Robert Blackstone

The International French fliers, Capt. Dieudonne Costes and Lieut. Comdr. Joseph Lebrix, made a spectacular landing here on their way to the coast rather than chance the flight over the White Mountains to Salt Lake.

Pilot Henry Boonstra of the Boeing Air Transport, on his way to Cheyenne, opportunely hove in sight as the French airmen were circling over Rock Springs, evidently looking for the Boeing company's landing field and hangar, Boonstra escorted the four-continent fliers to the little landing field four miles north of Rock Springs.

In landing the "Nungesser-Coli", their green-painted biplane here, these French aviators terminated a non-stop flight from Chicago of 1150 mi. in 12 hr.

The Gallic birdmen were entertained by Dr. J. H. Goodnough at a dinner to which many prominent citizens of Rock Springs were invited.

At the last meeting of the Lion's Club, members of the Aviation Committee, Dr. J. H. Goodnough and Claude Elias, reported that they had been able to interest the county in helping improve the local airport. The main thing that the county will do is lend equipment necessary to do the work of grading, draining and levelling the land which will be added to the present inadequate flying field.

Mr. Berry, field manager for the Boeing company, said that his company will furnish gasoline and oil needed to run the tractors and will also furnish some laborers.

The Lions committee is making plans now to raise the necessary money for the improvements. Its ambition is to have this work completed on the field by June 1, at which time it is expected the new type of passenger airplanes to be used this summer by the Boeing Air Transport will be placed in service.

Elko, Nev.

Thomas B. Bourne, superintendent of airways extension, Department of Commerce, operating out of this town, announces that by July 1, beacons from here to Wendover and to Reno will have been installed. This is not the only improvement that is being made on this transcontinental air line, for the construction of landing fields every 30 mi. is also part of the program. Mr. Bourne is operating west to Reno and F. S. Boggs is in charge to Wendover.

Plans call for flying fields at Battle Mountain, Beowawe, Carlin, Deeth, Wells, and Wendover—all in Nevada. Each of these fields will be outlined with boundary lights and a beacon of 2,000,000 candlepower to guide night pilots if forced to land. Beacon lights of the same candlepower will be placed every 10 mi., wherever the services of a caretaker can be secured. Each three and one-half miles over mountains and valleys will see the installation of a gas light. These gas lights are to be of the automatic sun-relay type, burning 200 nights without attention. Four gas lights will be installed between Elko and Carlin and eight between Carlin and Beowawe. Two

million candlepower lights will be placed between Beowawe and Battle Mountain. The gas lights are 500,000 candlepower. Over the Ruby Mountain area, east of Elko, gas lights will be placed every three and one-half miles. Electric beacons of greater candlepower will be erected, wherever possible, to connect with power lines.

The local airport will be equipped with beacon and boundary lights. The cost of placing boundary lights at one landing field is estimated at $6000. It will cost about $75,000 to install lights in the immediate territory around Elko

Dallas, Tex.

By Rorie E. Cowden

Capt. E. V. Rickenbacker recently commended the city in her efforts to establish a municipal airport. He says that this is imperative to assure that Dallas is not left out when the commercial transcontinental air lines route their planes through cities with the proper facilities. He says that it is possible for every city of 500 population in the United States to have a mile-square landing field for one-tenth of the cost of maintaining the highways of the United States for one year. He predicts that when more facilities and air lines are in operation passengers will be carried at half the present fare by rail.

The Captain also spoke before the directorate of the Chamber of Commerce at its weekly meeting. "Aviation will take the hazard out of business," he said. "Ten years ago we had to do our buying from 90 days to six months before our purchases arrived. Now we order between 30 and 90 days before we receive our goods. Soon it will require only 10 days, due to airplane delivery."

Dallas' commissioners are still discussing the purchase of Love Field as a municipal airport. It seems that the field is too small today and large enough tomorrow. It expands one day and shrinks the next. If it would only expand for two days in succession everything would be lovely. It is expected, however, that a definite understanding will soon be reached.

According to present plans a 20 room hotel, club house, and cafe will be built at the field immediately upon its purchase by the city as a municipal field. It is also understood that the Army will construct three steel hangars.

Port Arthur, Tex.

Construction of an airport on 200 acres of land adjacent to the refinery property at Port Arthur, Tex., has been started by The Texas Co. The land is now being plowed, disked, and rolled preparatory to the construction of asphalt runways approximately 1000 ft. in length.

Port Arthur is located only a short distance off the main route between New Orleans, Houston, and Mexican points and it is expected that an effort will be made to route a portion of the travel over the southern airway via Port Arthur. This city is also considering plans for the construction of a combination land and water landing field on park property along Lake Sabine.

The Texas Co. has placed an order for the delivery of a Ryan Brougham and it is expected the plane will be received about the time the oil company field is completed. The plane will be used by officials of the company in inspections of oil property.

Boise, Idaho

As Boise women are demanding membership in the Boise Flying Club it is being seriously considered by the club officers to make their institution co-educational, it was recently announced. The directors, who have taken the matter under advisement for 30 days, have in the meantime advised the would-be aviatrixes to send their applications to Henry A. Hardt, club secretary, Boise barracks.

"As some of these women express a perfect willingness to go through the ground school work on engines, rigging, and

mechanical features if only to get into the air," said Fred Kopke, club president, "it seems only fair to either admit them to the men's classes or establish separate ones for these emulators of Ruth Elder."

Spokane, Wash.

By F. Herve Partridge

Pilot Mamer recently flew his Buhl Airsedan over the Cascade Mountains, carrying four passengers, to demonstrate it to a Tacoma airways firm which is contemplating purchase of a cabin plane for sightseeing trips around Mount Ranier and the Tacoma country.

W. Pena Stohr, Montana pilot, was forced to extreme measures to reach Spokane to take his pilot's examinations. His plane was partly dissembled when he received a wire informing him that the inspector would be in Spokane the next day. Stohr worked on the Swallow all night, wheeled it out in the morning to the main street of Plains, Mont., and took off down the center of the main street. Helpers guarded side streets. Deep snows over the country prevented use of the fields ordinarily used. The rest of the trip to Spokane was without special event.

Special sightseeing tours around Spokane's surrounding beauty spots have been arranged by the Mamer service and by the Inland Eaglerock Co., territory agents for Alexander Eaglerock planes. Lieut. C. E. Bigelow is chief pilot, instructor, and company manager.

Felts Field, scene of the 1927 National Air Races, recently saw aerial activity in bunches blossom out with the spring. The first sunny Sunday more than 1000 cars visited the field. Six National Guard planes and five commercial machines kept the crowd entertained. Mamer's two Buhls, two Wacos, and a Swallow were in the air most of the time with cash customers in the passengers' seats.

Newark, N. J.

The new airport of The New Jersey Aero Club at Hanover, N. J., will be formally opened on Saturday and Sunday, April 28 and 29, with an Air Meet.

The contract for presenting the aerial exhibitions and handling the passenger carrying services during the two days was awarded to The Gates Flying Circus, of 870 Broad St., Newark, N. J., which also operates Teterboro Airport.

Work of improving the aero club field has been in progress all during the winter. Trees and stumps have been removed, ditches filled, and the final work of rolling and smoothing the field and improving the grass is now in progress.

The club has ordered two new planes, according to William V. Dragnett, president, and delivery on these planes is expected before the show.

Ivan R. Gates, head of the flying circus bearing his name, will be in charge of the exhibitions and passenger carrying. Diavalo the wing-walker, two parachute jumpers, and at least three stunt pilots will take part in the exhibitions, he said. Passenger carrying concessions now are being made to individual pilots through George Daws of the flying circus, Mr. Gates said.

As there is now an adequate flying field in the rich territory surrounding Hanover, it is expected that thousands of persons will attend the show. There will be an admission charged but a fee will be levied for automobile parking.

The club now has 45 students and expects to run the total to 100 by the end of the event.

St. Paul, Minn.

By H. A. Lindbergh

C. W. "Speed" Holman recently brought back the looping record to this country when he made 1,433 consecutive turns over the St. Paul Municipal Airport breaking the record of Alfred Fronval of France by 322 somersaults. The flight was made in the Laird Commercial biplane, in which he established

his previous record of 1,093 loops and won the Class A National Air Derby from New York to Spokane last year. Ideal weather conditions prevailed and as no engine trouble developed the exhaustion of the 97 gal. gas supply prevented "Speed" from continuing his five hour flight. Holman flew upside down for a short distance when he was through looping, barrel rolled, landed his Laird and remarked, "If any one wants the looping record now, they can have it I'm through."

The Northwest Airways, Inc., operator of the air mail route between Chicago and the Twin Cities, has contracted with the American Railway Express to carry express in addition to mail and passengers. Connections will be made at Chicago with the transcontinental planes and those going south to Dallas.

New Orleans, La.

By William N. DeWald

At a recent meeting held here between Assistant Postmaster General W. Irving Glover and officials of the St. Tammany Gulf Coast Airways, Inc., holders of C.A.M. No. 23, New Orleans-Atlanta, it was decided by the latter to start operation under its contract on the same day that the Pitcairn Aviation Co. starts the Atlanta-New York route, which date has been tentatively set as April 15. This decision was made notwithstanding the fact that the survey of the route by the Department of Commerce has only just started, and that the lights and intermediate fields will only be established about July. The schedule will be temporarily adjusted so that the plane leaving New Orleans in the afternoon will reach Atlanta just before dark, the mail leaving Atlanta on the Pitcairn plane at 9 P.M. Eastern time. The flying equipment to be used on this route previous to the installation of lighting equipment and intermediate fields is to be of a more or less temporary nature.

While on this visit here, Mr. Glover announced that New Orleans will be the divisional center on the international air mail line between Mexico City and the United States.

Denver, Colo.

By R. E. Ashbaugh

Alexander Aircraft Co. of Denver recently made the following Eaglerock deliveries: four to Aero Corp. of California, two to Jack Oates, Inc., Northern Illinois distributor, four to Wyoming Airways, distributor for Wyoming, Montana, and Western Nebraska, two of these last being for National Parks Scenic Airways, dealer at Billings, Mont.

Five were sold to Rapid Airlines, Inc., North and South Dakota distributor, one Eaglerock with Edo pontoons was shipped to the Olympic Aeronautical Corp., Western Washington distributor, and one to Steele Airlines, Inc., Western Kansas and Eastern Nebraska distributor. Other companies purchasing planes are Atlantic Airways, New York, New Jersey, and Connecticut distributor, the Bell Airline Service, Oregon distributor, and the Morris Flying Service, Western Pennsylvania and Northeastern Ohio distributor.

Competing with 14 other commercial planes, James S. Charles, Virginia Eaglerock distributor, recently won the bombing, speed, and stunting contests at the opening of the Rocky Mountain Airport. Three silver cups were awarded to Charles.

Norman, Okla.

Plans for advanced courses in aeronautics at the University of Oklahoma here are being made. The school already has three years of applicable work in the school of mechanical engineering. All of these courses will be in designing and structural work. A wind tunnel is one of the laboratory accessories that the school hopes to have soon.

This work is part of the accomplishments of Tau Omega, the newly formed aviation fraternity here. It has taken in six new members and now has 14. Pins have been designed. The background is an onyx cross with gold border; the composite of the center of the pin is a yellow gold radial engine. In the four corners of the cross are the Greek letters Tau and Omega and a torch and sooner wagon.

The Oklahoma Air Transport Co. is planning much work for the coming season and is repairing its present plane, a Waco. The company has ordered an American Eagle and will use it in work this summer.

Kansas City, Mo.

By H. H. James

Arrangements for airport facilities in Kansas City will be completed by the Yelloway bus system shortly. The airport will be used by the transcontinental planes to be operated by Yelloway, Inc., between the West Coast and New York. The service is expected to be in operation soon.

Roger W. Taggart, president of Yellnway, Inc., has been in Kansas City completing the arrangements. He said the company expects to operate three Fokker cabin monoplanes on the air route through Kansas City on regular schedules.

The branch of the Porterfield Flying School of Kansas City, has been opened in Garden City, Kan., at the municipal airport there. The instructions will be given by Capt. L. A. Miller, a graduate of the Kelly Field and an Army school in France, and Lieut. George Boyd, also a Kelly Field graduate. The school has a capacity of 50 students.

Carl Zier, who has been operating a flying field at Odessa, Tex., has joined the organization at the Bennett Flying School, Kansas City, as a pilot.

Two new instructors—Lieut. George Boyd of Langdon, S. D., and Lieut. J. E. Foster—have been added to the staff of instructors at the Porterfield Flying Field. Lieutenant Boyd will teach ground and flying training and Lieutenant Foster will lecture on engines, construction and repairs. Eleven new students have enrolled in the school recently.

Fort Dodge, Ia.

By Louis Savadge

Conferences are to be held here within a short time which will settle route of the proposed Chicago-Sioux City commercial air route, serving half a dozen Iowa cities, according to S. J. Price and W. B. Swaney, member of the local committee. The project is being sponsored by W. W. Stevens, Sioux City attorney, donor of the Sioux City air depot site, who is advocating organized support of a route connecting with Chicago on the east and Cheyenne and Denver to the west. Sioux City, Fort Dodge, Waterloo, and Dubuque in Iowa and Freeport and Rockford in Illinois are towns on the present route. All of them have, or are about to establish, airports. James Sarwick, operating the Sioux City port, owns several planes, has a large class of embryo fliers and does commercial flying over a wide territory, being licensed for a route from Minneapolis to Rochester, Minn., and plans to bid on the first mail route serving that territory. Waterloo has a $10,000 fireproof airport with capacity for 10 planes and the field well lighted. Two planes and a full time pilot are maintained by the operating company. As soon as weather permits a caravan of planes will travel over the route visiting the various centers in effort to create further interest and get the project well under way this summer.

Salt Lake City, Utah

National Parks Airways, Inc., the new air mail line operator between Salt Lake and Great Falls, Mont., announces the first of the four Fokker Super-Universals will be delivered in May with the others arriving at two weeks intervals. The planes will be given tests over the route prior to its opening in June. Felix Steinle, in charge of operations, is now making a survey of the line, selecting landing fields and doing other preliminary work before the opening.

The Fokker Super-Universals to be used will be powered with the Pratt & Whitney 425 hp. Wasp engine. High horsepower is desirable over this rugged section.

UNITED STATES AIR FORCES

Flying Ratings Held by 42 Enlisted Men

Among the enlisted personnel of the Army Air Corps there are 42 men who hold flying ratings, 23 being qualified airplane pilots, 11 junior airplane pilots, 6 airship pilots, and 2 junior airship pilots. All but one of these enlisted fliers are non-commissioned officers, 15 being master sergeants, 8 technical sergeants, 10 staff sergeants, 5 sergeants, and 3 corporals. The lone exception is a flying cadet who, while holding a commission as 2nd lieutenant in the Air Corps Reserve by virtue of graduating from the Advanced Flying School, Kelly Field, Tex., is being retained on active duty on cadet status.

The 42 enlisted fliers of the Army Air Corps are listed below as follows:

Alabama Staff Sergt. Samuel B. Turner, Camden.
Arizona Staff Sergt. Samuel J. Sumner, Williams.
California Sergt. Lyman E. Ellis Redlands; Mast. Sergt. Thomas J. Fowler, San Francisco.
Illinois Mast. Sergt. Olin Brown, Sparta, Corp. Harold B. Fisher, Belvidere.
Indiana Staff Sergt. George Wiggs, Spurgian.
Iowa Staff Sergt. Orvil W. Haynes, Grinnell, Tech. Sergt. Ronald H. Short, Hazleton.
Kansas Corp. Harry C. Lewis, Columbus; Sergt. Robert B. DeWald, Russell.
Kentucky Corp. Maurice B. Rikard, Glasgow Junction.
Louisiana Staff Sergt. Fred O. Tyler, Jeanerville.
Maryland Mast. Sergt. Stewart Q. Smink, Baltimore.
Massachusetts Tech. Sergt. Chester F. Coby, Dorchester; Mast. Sergt. Peter Bicolot, Springfield; Mast. Sergt. Joseph H. Bishop, Lynn.
Michigan Staff Sergt. Cecil E. Grile, Lansing.
Missouri Staff Sergt. Fred I. Pierce, Desloge; Cadet James C. Richardson, Kansas City; Staff Sergt. Byron E. Newcomb, Carrollton.
Nebraska Mast. Sergt. William J. Bennett, Bellevue.
North Carolina Mast. Sergt. Conrad L. O'Briant, Rosemary; Tech. Sergt. James A. Lee, Seven Springs.
Oregon Mast. Sergt. Chester W. Kaliski, Portland; Tech. Sergt. Carlton F. Smith, Portland; Mast. Sergt. Ezra P. Fendall, Wood Furs Mast. Sergt. Albert C. Gamble, Astoria.
Oklahoma Tech. Sergt. Marvin F. Miller, Shawnee.
Pennsylvania Tech. Sergt. Boyd F. Erwine, Ringtop; Sergt. Joseph F. Murray, Chester.
Texas Mast. Sergt. William M. McConnell, San Antonio; Mast. Sergt. Jos. Grant, San Antonio; Tech. Sergt. Leslie L. Wells, San Antonio; Mast. Sergt. Bernard Wallace Chinn; Tech. Sergt. Samuel J. Davis, Denison; Sergt. Harry P. Gibson, Houston.
Virginia Staff Sergt. Warren S. Rosenberger, Stanton; Sergt. Edward A. Hevra, Petersburg; Mast. Sergt. Douglas Johnston, Chase City; Staff Sergt. James H. Craine, Langley Field.
Washington Mast. Sergt. Fred Kelly, Wenatchee.

Loening Amphibian Crosses Continent

Piloted by Lieut. Bernie R. Dallas, a standard service Loening Amphibian plane powered with an inverted Liberty engine recently completed the first transcontinental flight of this type of craft. Averaging a speed of slightly better than 100 m.p.h., the amphibian flew from New York City over a route of 3,300 mi. to Rockwell Air Depot, San Diego, Calif., in the flying time of 32 hr. 45 min.

Stops en route were made at Dayton, O., Fort Riley, Kan., Amarillo, Tex., El Paso, Tex., and Tucson, Ariz. Lieutenant Dallas was accompanied on the trip by Beckwith Havens, sales manager of the Loening company.

New Blue Flying Cadet Uniform Approved

The Secretary of War has approved the specifications for an attractive special uniform to be issued to flying cadets of the Air Corps as soon as the uniforms can be produced in sufficient quantity. This uniform will be a slate blue. It will consist of a roll collar, trousers without cuffs, dress cap of overseas design, black kid shoes, and blank patent leather dress belt. A white shirt and black tie will be worn with the coat. For wear without the coat there will be issued a shirt of the same color as the uniform.

To Build New Air Station in Canal Zone

Air defenses of the Panama Canal are to be augmented with the building of Albrook Field, a new air station, at the Pacific entrance to the canal. Work on the new airport is to begin in July, according to plans.

WHERE TO FLY

California

California

California

Connecticut

Illinois

Illinois

Illinois

Illinois

Illinois

Indiana

Indiana

Iowa

Iowa

Kansas

Kansas

Kentucky

WHERE TO FLY

WHERE TO FLY

Index to Advertisers

The Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

The Aircraft Service Directory

WHERE TO PROCURE EQUIPMENT AND SERVICES

Aircraft Service Directory

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912, of AVIATION published weekly at Highland, Ulster County, New York for April 1, 1928

STATE OF NEW YORK } ss.
COUNTY OF NEW YORK }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Earl D Osborn, who, having been duly sworn according to law, deposes and says that he is the Business Manager of AVIATION and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are

Publisher, Aviation Publishing Corporation 250 W 57th Street, New York City Editor, Earl D Osborn 250 W 57th Street, New York City Managing Editor, R. Sidney Bowen jr, 250 W 57th Street, New York City Business Manager George Newbold, 250 W 57th Street, New York City

2. That the owner is: (If the publication is owned by an individual his name and address, or if owned by more than one individual the name and address of each, should be given below; if the publication is owned by a corporation the name of the corporation and the names and addresses of the stockholders owning or holding one per cent or more of the total amount of stock should be given.)

Aviation Publishing Corporation, Earl D Osborn, 250 W 57th Street, New York City

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of the total amount of bonds, mortgages, or other securities are

None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is . . .
(This information is required from daily publications only)

Earl D Osborn, Owner.

Sworn to and subscribed before me this 30th day of March 1928
[Seal] HANNAH GOLDENSON
(My commission expires March 30 1930.)

CLASSIFIED ADVERTISING

15 cents a word, minimum charge $2.50, payable in advance. 15 cents a word if box number is used.
Address replies to box numbers, care AVIATION, 250 W. 57th St., New York.

FOR SALE

ATTENTION AVIATORS Graphite valve guides threaded into OX and OXX cylinders. Removable valve seats installed. Graphite piston rings. Prices and descriptive literature upon request. IR. Flying Co., 507 Locust St., Sterling, Ill

FOR SALE Two C-6 motors with Bijur starters $1200 00 Four model are crank-cases without shafts and one model A crank-case with four crankshafts for $300 00 Sew Orleans Air Line, New Orleans, La.

FOR SALE Standard J-1, new last November; cone control, good running order; reasonable; located in New York; can be seen any time. Box 309 AVIATION

ONE STANDARD, one Jenny, one Avro, all less motors. One Canuck with OXX 6, one Waco 9 with OX-5, two completely rebuilt Standards with OX 5, one model A Hisso Also Standard wires, turnbuckles and fittings Stock priced right. Write us. St. Louis Aircraft Co., Augusta Mo

FOR SALE Hisso International, model F 17, four place, dual controls, complete set instruments, including air speed and bank turn indicator Ship and engine practically new Price $3200 00 W Lester Lambie, Petersville Calif

FOR SALE Small modern monoplane, Lawrance engine. Landing gear struts need inexpensive repairs. Good condition otherwise Sell cheap as is At warehouse Box 844 AVIATION

STANDARD OX 6 motor turns up 1500 in air Fuselage recovered, all surfaces revarnished and silvered. Entire ship A-1 condition C R. Mahlberger Newton, Ohio

FOR SALE 1 Thomas-Morse S-4-C Scout with Le Rhone motor Also spare parts for engine and plane Located near Asbury Park, N J Will not crate for shipment $270 00 Laurence Reynolds 32 E 79th St New York City

FOR SALE Gnome Rotary 165 hp. run 2 hours, complete with prop. $1000 00 Herbert E Kalbach, 608 Temple Bldg. Rochester, N Y.

FOR SALE One five-place, all metal, Sikorsky type S-32, biplane, open cockpits equipped with Liberty 400 hp engine Either wheels or pontoon under carriage Two spare Liberty engines Andian National Corp. Ltd 44 Victoria St. Toronto-2, Ontario Canada

IRVING AIR CHUTE 24 ft seat type, never used, like new $300 00 or complete OX 5 motor in good condition Claude T Wilbur, Wasta, S Dak

FOR SALE Bellanca sport biplane 65-50 Amanti A-1 condition $1450 00 We buy and sell Bellanca sport parts Let us rebuild your airplanes and engines Licensed mechanics only Let us quote prices Aerotech Aircraft Works Kalamazoo, Mich

FOR SALE 1927 L-6 S Excellent condition lots of spares. Motor turns 1650-1700 rpm Also two OX 6 Standards Okmulgee Aviation Co 611 N Collins Okmulgee Okla

FOR SALE OR TRADE Hacker design speedboat with Curtiss OXX 6 motor with Capitol conversion Will sell for $2,000 00 or will trade on an airplane seaplane or flying boat. Boat in A-1 condition and stationed on the Detroit River Indianapolis Aviation Co Indianapolis Ind.

FOR SALE Ware ten OX 5 Like new Perfect condition Complete equipment $2650 00 cash Fly away delivery Swaby Flying Service St Charles Ill

FOR SALE 1 Lincoln Standard flight sport model plans New ship Box 847 AVIATION

FOR SALE Rebuilt OX 5 in good running order Can be seen at premises Inquire Fairchild Caminez Engine Corp. Farmingdale L. I N Y

EQUIPMENT WANTED

WANTED Used OX 5 motors or parts. Also OX-5 crash cases and OX 6 crash cases Box 782, AVIATION

WANTED OX 5 motors and parts. Also Canuck or Jenny parts or complete ships Any condition P O Box 'Q', Passaic, N J

WANTED Cargo airplane capable of carrying 1000-1500 lbs., pay load. Give full specifications and performance. Lowest cash price for quick sale Box 852 AVIATION

WANTED Used, new production jab good general condition. Similar to American Eagle or Eaglerock. State full particulars including history price and terms. Box 815 AVIATION

WANTED TWO OR THREE place plane in flying condition State lowest price description and if licensed. R L. Miller 322 Hartwell Ave. Waukesha Wis

WANTED COMPLETE set fittings for Lincoln sport plane. United Airways, Monroe, N Car.

WANTED USED WHIRLWIND; must be complete. State lowest price and complete details in first letter Riley Burrows, Liberal Kans

CASH FOR JENNY or Standard, good flying condition. Will buy small sport plane if price is right. C. W. Bopp, Leechburg, Pa., R. 3, Box 119

POSITIONS WANTED

CIVIL ENGINEER with 12 years experience in responsible charge construction work, surveys and management, desires position any branch airplane industry, any location. Can pass any test required. Aeronautical ground course completed. All replies confidential. Any reasonable offer considered. C H. Mouserpenny Escanaba, Mich

LICENSED TRANSPORT PILOT new instructor in flying school wishes connection with flying circus. Only first class proposition considered. Service available in 15 days. Box 839, AVIATION

EXPERT MECHANIC owning licensed Hisso-Standard near New York needs connection with transport pilot of long experience as partner Box 838, AVIATION

MECHANICAL ENGINEER. Graduated 1921 17 years varied experience, manufacturing and engineering. Flying duty Carruthers Field during War period. Wish to enter airplane manufacturing field. Desire connection with good company in production department. Box 836 AVIATION

YOUNG MAN HANDY all tools, desires connection with airplane company or individual to learn aviation 10 hours dual experience. Salary no object. Go anywhere. Box 843, AVIATION

TRANSPORT PILOT, 2800 hours, all types, barnstorming, night flying instructing, exhibitions. Experienced managing schools and field. Free May 1st. Employed at present with one of the oldest and largest aviation companies in America. Box 845, AVIATION

POSITION WANTED Wing walker or acrobat wishes connection with reliable man. Does a swinging by teeth stunt. Will also help on field. R. C Conrad, Box 122 Canal Winchester, Ohio

POSITION BY WAR TIME pursuit pilot. 8 years truck selling experience Must hold chance for future. Box 841, AVIATION

LICENSED AIRPLANE MECHANIC. Am also radio telegraph operator Go anywhere Have family Steady. R. D Payton, 125 Third Ave N E Oelwein, Iowa.

HELP WANTED

WANTED Experienced aerial photographer, capable of directing pilot on flight lines from boats. State experience in map assembly work, whether married or single and salary required. Box 840, AVIATION.

EXPERIENCED AIRPLANE MECHANICS A new, well equipped, well financed airplane plant in Eastern Central Pennsylvania, offers attractive opportunities to men thoroughly experienced on rib and wing construction, fittings, fuselage tubing steel tail surfaces, engine installation, fabric and dope interior finish and cabinetry. Amateurs without at least 8 months factory experience please do not answer. Box 837, AVIATION

MISCELLANEOUS CLASSIFIED ADVERTISING

WILL TRADE 20 Pontiac coach, first class shape and have some cash for good OX 5 ship what have you? C. H. Inmann, 400 N Tuhs St., Pratt, Kans

WILL TRADE my $4,000.00 equity with deed in Indianapolis, Ind., rental, renting sum $600.00 to $640 00 per year, excellent conditions, will always rent, for late production ship. Must be good as new and either airworthy or licensed. Herman F. Roesch, Indianapolis, Ind.

THOROUGH GROUND school course. Next class now forming at the ground school of the First Wing Cadet College in America's first independent air force. Personal interview with Registrar, Hotel Maryland, 104 W 40th St., 9 to 5 P.M daily or write U S Volunteer Air Service, 500 Fifth Ave., New York City

AIRPLANE AND MOTOR repairs, wings recovered, motors overhauled, rates reasonable Mill Basin Aircraft, Inc., Mill Basin, Brooklyn, N. Y. Phone Navarre 2183

WANT TO HEAR from someone who wants to buy half share in Jenny Also to hear of Jenny, Canuck for sale. F von Haessler, 88 Hasen Ave., New York City

"The Oldest Flying Organization in the World" Announces a New 50 Hour Flying Course

Specially prepared for those who are desirous of obtaining an Industrial or a Limited Commercial Pilot's License

THE Curtiss Flying Service at Curtiss Field, N. Y., is now prepared to offer to students the finest flying course that has ever been offered by a civilian organization. The student is not merely taught to fly as quickly as possible and then allowed to practice "solo" until the 50-hour mark is reached, but is carefully put through a well-planned course that trains him in every branch of commercial flying.

THIS includes primary instruction in take-offs, landings and straight flying, advanced instruction in turns, spirals, cross-wind and side-slip landings and acrobatics, and actual experience in map-reading and cross country piloting on trips to Boston, Philadelphia, and other cities. Due to the completeness of the Curtiss Flying Service equipment, the student gets instruction on all types of aircraft, monoplanes and biplanes, open cockpit and cabin types.

HAND in hand with the actual flying training is a thorough ground-school course, based on Department of Commerce regulations, and covering all necessary points, including principles and theory of flight, rigging, engines, ignition, carburetion, instruments, aerology and navigation, air rules and regulations, etc.

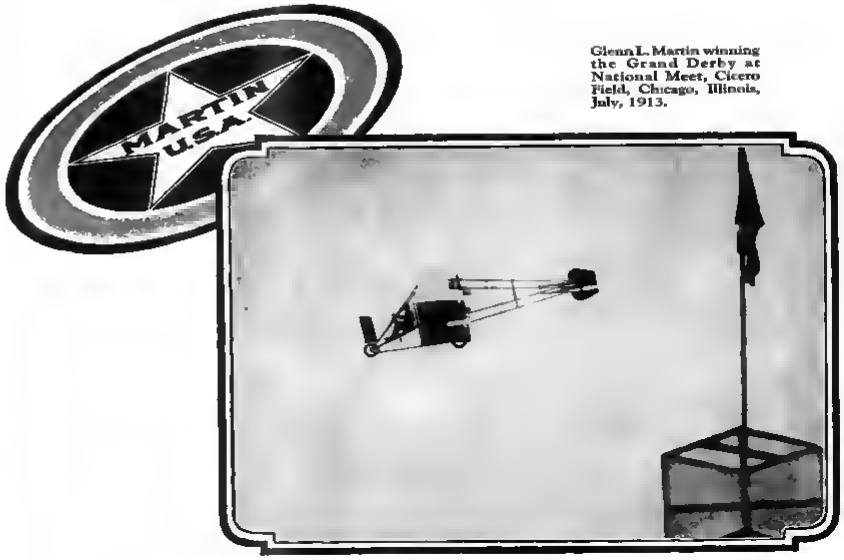
STUDENTS who enroll in this course are assured of obtaining the finest training possible, from a world-famous organization that has made a business of flying for more than ten years. Last year our pilots flew over 350,000 miles, and we "soloed" more than 200 students. All equipment and personnel licensed by Department of Commerce.

IN addition, we offer our standard ten-hour course, and a twenty-five hour course for those wishing to obtain a Private Pilot's License.

New Booklet Now Ready

The CURTISS FLYING SERVICE, Inc.
Curtiss Field, Garden City, N. Y.

Curtiss
"Speed with Safety"



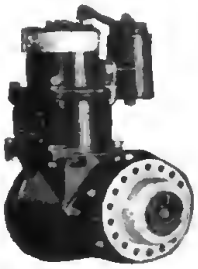
Glenn L. Martin winning the Grand Derby at National Meet, Cicero Field, Chicago, Illinois, July, 1913.

EXPERIENCE Eighteen years of specialization, dating back to the first beginnings of the art of aeronautics, has taught the Glenn L. Martin organization how to accomplish, on a production basis, jobs which other experts assured us "couldn't be done"—an asset of inestimable value in building today's planes and perfecting the aircraft of tomorrow.

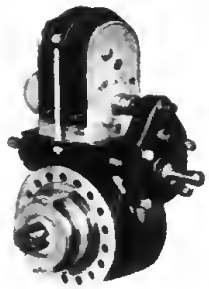
THE GLENN L. MARTIN COMPANY
Builders of Quality Aircraft since 1909
CLEVELAND, OHIO

MARTIN U.S.A.

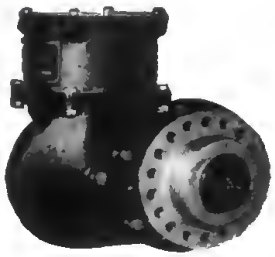
OVER a period of twelve years, Eclipse has specialized in the design and production of Aviation Engine Starters ✣ This experience is reflected today in a complete line of starters and generators, built to fit almost every type of engine, and to meet all operating conditions ✣ Write for full information, specifying the engine on which you are interested in installing a starter ✣



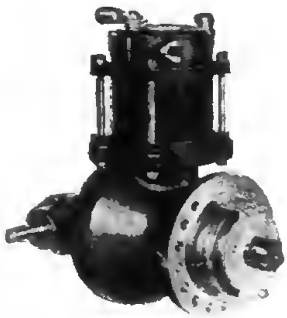
Eclipse Series 7 Combination Hand and Electric Inertia Starter. Vertical type, adapted for V-type or radial engines up to 2500 cubic inches.



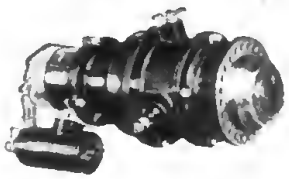
Eclipse Aviation Hand Starter with Booster Magneto Integrally mounted. Hand-turning gear 6:1 Reduction for Engines up to 900 cubic inches; 12:1 Reduction for Engines up to 1400 cubic inches; 18:1 Reduction for Engines up to 2000 cubic inches.



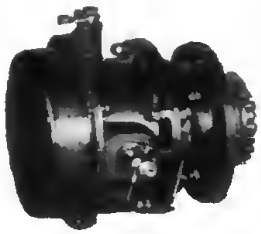
Eclipse Series 7 Hand Inertia Starter. Vertical type, adapted for V-type or radial engines up to 2500 cubic inches.



Eclipse Direct Cranking Combination Hand and Electric Starter, adapted for application on engines up to 2000 cubic inches.



Eclipse Series 6 Combination Hand and Electric Inertia Starter for radial engines up to 1350 cubic inches; Series 11 Combination Hand and Electric Inertia Starter for radial engines up to 2500 cubic inches. Concentric type, with magnetic switch.



Eclipse Series 6 Hand Inertia Starter. Concentric type, particularly adapted for radial engines up to 1350 cubic inches. Series 11 Hand Inertia Starter for radial engines up to 2500 cubic inches.

Eclipse Aviation Generators. 15 Volt, 15 Ampere capacity and 15 volt, 25 ampere Capacity, voltage regulated, Engine driven type.

ECLIPSE MACHINE COMPANY

EAST ORANGE PLANT

Elmira, New York East Orange, New Jersey Walkerville, Ontario

ECLIPSE

AVIATION ENGINE STARTERS AND GENERATORS